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PEPPER CREEK
FLOOD PREVENTION AND DRAINAGE
RC&D MEASURE

FINAL ENVIRONMENTAL IMPACT STATEMENT

Otis D. Fincher, State Conservationist
Soil Conservation Service

Sponsoring Local Organization

Delaware Department of Natural Resources
and Environmental Control
Dover, Delaware 19901

July 1980

Prepared by:

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FINAL EIS

PEPPER CREEK FLOOD PREVENTION AND DRAINAGE RC&D MEASURE

This addendum shows a list of preparers of the EIS and their qualifications.

Name	Present Title (Time in Job - Years)	Education (Degree(s) - Continuing Education Subjects)	Experience (Title and Time in Job)	Other (License, etc.)	Responsibility in Preparing EIS
Richard P. Bennett	Dist. Cons. - 16 yrs.	BS - Agronomy Univ. of DE Environmental Development Course - Univ. of GA	Soil Cons. - 2 yrs.		-Chairman of Environmental Assessment Team. Worked on assessments of socio-economic effects, appearance of the landscape, changes in land use, wetlands, water table alterations, water quality, and water quantity. Helped prepare narrative. Participated in field review with professional archaeologists.
James P. Gorman	Resource Cons. - 8 yrs.	BS - Agronomy Univ. of ME Environmental Development Course - Univ. of GA	Dist. Cons. - 10 yrs. Soil Cons. - 2 yrs. Watershed Planner - 7 yrs. RC&D Coordinator - 7 yrs.		-Member of environmental assessment team. Worked on assessments of erosion and sedimentation, man-altered streams, changes in land use, water table alterations, archaeological and historical resources, water quality, and water quantity. Helped prepare narrative.
Grady E. Griggs	State Cons. Engineer - 5 yrs.	BS - Agri. Engineering Univ. of TN Environmental Development Course - Univ. of GA	Water Resources Planning Spec. - 2 yrs. Agri. Engineer - 17 yrs.	P.E. License	-Coordinated development of statement. Worked on assessments of erosion and sedimentation, water table alterations, change in flow regime, changes in air quality, man-altered streams, water quality, and water quantity. Helped prepare narrative.
Vernon M. Hicks	Biologist, NETSC - 6 yrs.	BS - Biology - Texas A&M Environmental Development Course - Univ. of GA	Biologist - 23 yrs.		-Worked on upland wildlife assessments and reviewed all biology assessments and inputs.
Michael L. Kolman	Economist - 2 yrs.	BS, MS - Pennsylvania State University	Prior experience with private firms		-Worked on socio-economic and economic assessments. Helped prepare narrative.
Douglas G. Meagley	Biologist - 2 yrs.	BS - Wildlife Management	Dist. Cons. - 3 yrs. Soil Cons. - 4 yrs.		-Worked on assessments of wetlands, migration routes, upland wildlife habitat, woodland habitat, rare and endangered species, water quality, water quantity, and man-altered streams.

INTRODUCTION

This environmental impact statement addresses the Pepper Creek Flood Prevention and Drainage RC&D Measure located in Sussex County, Delaware. It has been prepared by the Soil Conservation Service and is based on assessments made by an interdisciplinary team. The team consisted of staff members of the Soil Conservation Service in Delaware and Maryland, the U.S. Fish and Wildlife Service, and the State of Delaware.

The proposed works of improvement are to be installed in accordance with procedures in Title 7, Chapter 41, of the Laws of Delaware and with plans and specifications prepared by the Soil Conservation Service. Costs will be shared by the sponsoring local organization and the Soil Conservation Service in accord with provisions of the Resource Conservation and Development program.

The narrative herein has been revised to a great extent as a result of comments received during review of the draft. The project elements have not been changed significantly, except that the Nonproject Measure of the state has been dropped. The bridge in Dagsboro is to be replaced by the state to alleviate flooding.

Consultation and coordination with EPA and U.S. Fish and Wildlife Service has been conducted by mail and in meetings to resolve agency concerns.



SUMMARYProposed Action

The proposed action consists of channel work in selected areas and selective clearing and snagging work to improve drainage and reduce flooding in the 43-mile Pepper Creek Tax Ditch system. Additionally, the state of Delaware will replace a small, concrete bridge at the Pepper Creek crossing on Route 26 in Dagsboro to remove the flooding hazard in the community.

The Pepper Creek Tax Ditch system was reestablished in June' 1979 in accord with Chapter 41, Title 7, of the Laws of Delaware. Planning, design, and construction will be performed under the provisions of Section 102 of the Food and Agriculture Act of 1962 (PL 87-703), and the Soil Conservation Act of April 27, 1935 (16 U.S.C. - 490a-f). The purpose of the work is to reduce flooding and provide drainage for about 3,100 acres of cropland, 1,100 acres of forestland, and 140 acres of residential areas. Principal benefits to the residential areas will be reduction of flooding from a five year, 24-hour frequency storm as a result of improved channel efficiency which will also permit drainage of excess water from the agriculture lands.

The plans, designs, and specifications for the Pepper Creek Tax Ditch system are to be prepared by the Tax Ditch Commissioners for Sussex County with assistance from the Soil Conservation Service through the Sussex Conservation District. Contracting and procurement will be by either federal contract, or by a locally awarded contract. Cost sharing will be provided by the Soil Conservation Service under the Resource Conservation and Development Program. Installation will be supervised by the Soil Conservation Service. Operation and maintenance will be the responsibility of the local organization.

The locations of the portions requiring channel work will be determined by reconnaissance and engineering surveys of the drainage system. Some areas will require only clearing and snagging to remove flow obstructions; some areas will require removal of sediment bars; some areas in agricultural production will require deepening and enlargement of the channel to restore drainage efficiency and carrying capacity to achieve the desired benefits to the agricultural lands.

Rural waste water management studies have recently been extended into the Dagsboro-Frankford area in conjunction with the 208 Water Quality Program. These show that many of the problems with septic systems in the area are directly associated with poor drainage and flooding conditions.

Construction will be performed to leave one bank of the channel undisturbed when (1) hedgerows of significance to upland habitat exist along the channel; (2) there is an existing channel so that one bank can remain essentially undisturbed, a minimum depth of 3 feet, with stable side slopes and a minimum of overhanging or leaning trees; (3) the constructed bottom width is 15 feet or less; and (4) the affected sponsors and landowners agree. Where all of these criteria are not met, discriminate pruning of large material will be considered to reduce hazards to the channel banks.

Vegetation will be established by seeding along the channel banks on a daily basis after construction to minimize production of sediment and then along the berms when construction is completed. The permanent grass strip will serve as a buffer strip to filter sediment and to minimize erosion should overbank flow occur; as a travel way for operation and maintenance; and as habitat for wildlife.

Replacement of the bridge on Route 26 in Dagsboro by the state will remove the health and safety hazards associated with flooding at the highway. The replacement structure will accommodate future with-project peak flows.

Impacts

The principal impacts of the planned action will be removal of the hazard to public safety and health by replacement of the small concrete bridge in Dagsboro by the state, and the reduction of erosion rates on 1,200 acres of wet cropland soils through use of conservation cropping systems permitted by providing adequate drainage.

Replacement of the Route 26 bridge with a structure adequate to accommodate future with-project peak flows will eliminate the flooding of the homes, businesses, and highway in Dagsboro and the associated hazards to public health and safety. Flooding under existing conditions will reach a depth of 2.6 feet above the road during a storm having a one percent chance of occurrence (100-year frequency) during a given year. Future with-project peaks would increase peak flows about 18 percent and raise the crest about 0.6 feet under existing conditions.

Construction activities associated with replacement of the bridge will include cleaning the channel for about 100 feet upstream and far enough downstream to accommodate the peak flows.

Erosion rates will be reduced by reducing the flooding frequency on the wet cropland soils and removing gravitational water from the soil profile to permit use of conservation cropping systems which include no-till farming and cover crops. Moreover, a greater volume of rainfall will infiltrate the soil and will be temporarily stored. Part will be used by crops, part will replenish the volume stored in the soil profile, and part will enter the base flow and prolong its duration. Drainage will improve aeration of the soil profile and cause more oxygen to be available to plant roots; less nitrate nitrogen will be lost in the form of nitrogen gas; efficiency of use of phosphorous fertilizer will increase; rooting depth will be increased; and a wider adaptation of the drained soils to a greater number of crops will result.

Construction activity is expected to result in temporarily higher turbidity levels and suspended sediment concentrations. This increase is expected to result from dislodgement of soil particles during the excavation of the sediment in the channels. The concentration of suspended soil particles will reduce after the construction period to about the same level as before construction. The reduction of flooding frequency and reduction of erosion rates on wet cropland soils, however, will reduce the amount of sediment on an annual basis.

Drainage will remove the gravitational water in the soil profile for depths up to 3 feet and up to 150 feet to either side of the channels. Only that water which is not attracted by the soil through physical, chemical, or electrical forces will be removed. Neither the normal water table nor any known aquifers will be adversely affected. Moreover, runoff will be temporarily stored in the soil profile and will be available for use by the crops, for replenishment of water held in the soil profile, and to prolong base flow in the channels.

Wetlands in the construction areas consist of some areas of Types 3 and 5 within the confines of the channels. Some of these areas will be destroyed by the construction work, but are expected to regenerate within 2 years. Additionally, similar areas will be created at other locations where sediment traps are constructed as part of the design, and both upstream and downstream of culverts at road crossings. The upstream area will initially be a Type 5 which will succeed to Type 3 as sediment fills the sediment trap. The downstream area will have Type 5 which will transform to a Type 3 if perennial and intermittent flow patterns exist.

Complete removal of hedgerows could cause a decrease in quality of wildlife habitat of about 5 percent for rabbits and quail. Retention or replacement of the hedgerows would increase quality of the habitat by about 3.5 percent. Neither extreme is expected. Landowners are expected to include wildlife habitat enhancement practices in their conservation plans. Natural vegetation is expected to generate satisfactory habitat within a reasonable period after construction. A report by McIntosh on wildlife management states that drainage and flood prevention projects permit more efficient use by wildlife of existing habitat.

Socio-economic effects which are expected to result will include the effects of some added increase of families moving to a more rural location. Overall, the expected effects from this aspect should be favorable inasmuch as the economically marginal lands will be improved by the reduction of flooding frequency to the extent these scattered areas could be used for homesites. This would be an improvement over the areas which are currently too wet and frequently flood, but are sold for homesites. Existing homesites would similarly benefit from the drainage and flood prevention measures. These effects will be favorable for both the human and natural environment.

Low income persons will benefit from the improved drainage and flooding of homes, yards, and streets. A serious health hazard presently exists because individual septic systems do not function properly due to the wet soils. The hazard is worsened when the areas are inundated by floodwaters. Social activities such as recreation are not reasonable in the area. Community sanitary sewer systems are far in the future for some of the areas. Proper drainage will relieve the flooding conditions, reduce the wetness problems, and abate the health hazard associated with these problems.

Community benefits can be increased through implementation of community improvements which will be permitted by the improvements resulting from this measure. No demographic or civil rights impacts are expected.

Economic effects will result from the improvement in crop management potential. The area is active in the production of corn and soybeans for the Delmarva poultry industry. The corn produced by the entire peninsula supplies about 70 percent of the need for the poultry industry, and when yields of corn increase, a parallel increase in poultry production is expected to occur. Soybeans excess to the needs of the local industry are exported. Annual growth of the industry currently requires yields from 2,000 acres of corn and 2,300 acres of soybeans. Land adequately drained and with greater production potential is better suited to meet these needs. Feed grains locally grown will help to maintain reasonable prices for poultry products in the eastern megalopolis as well as help to reduce energy consumption and transportation costs in production and marketing activities.

Drainage of the forestland within the watershed will improve the vigor of loblolly pine stands and also permit the production of desirable hardwoods.

Replacement of the small concrete bridge on Route 26 will remove the threat to public safety by eliminating flooding of the road during future storms.

Operation and Maintenance

Pepper Creek Tax Ditch will be responsible for the operation and maintenance of the improvements installed. The Pepper Creek Tax Ditch and the Soil Conservation Service will enter into an operation and maintenance agreement for the project prior to execution of a project agreement for construction of the planned work. The operation and maintenance agreement will be in accordance with the Delaware Operation and Maintenance Handbook and will set forth the operation and maintenance requirements for the channels, vegetation and other work installed as a part of the project. The estimated annual cost of operation and maintenance is \$7,900. and will be borne by the Pepper Creek Tax Ditch. Operation and maintenance work will include such actions as: mowing, brush control, stabilizing, fertilizing, reseeding critical areas, bar removal, debris removal, keeping access roads open for maintenance, maintenance of vegetated filter strips, etc.

Discriminate mowing will be performed to better serve wildlife habitat quality. Mowing along one side and preservation of beneficial plants will improve habitat quality. Seasonal mowing will benefit the nesting species and enhance their survival.

Inspection of the improvements will be made annually by Pepper Creek Tax Ditch and the Soil Conservation Service for a period of three years. Annual inspection reports will be supplied to the Soil Conservation Service following each inspection. Upon request, the Sussex Conservation District will provide technical assistance for needed maintenance work as financial and technical resources are available.

Archaeological and Historical

A review of the National Register of Historic Places reveals that no entries would be affected by project action. No sites or structures considered eligible for listing will be affected by project action.

A review of the project area by the Delaware Division of Historical and Cultural Affairs determined the presence of areas of high archaeological potential which lie outside the project construction areas. The State Historic Preservation Officer reported by letter with a copy of preliminary plans for the project on which were noted areas of high archaeological potential and stated:

"These areas consist of well-drained hills near the project. Only one site, 7S-K-12 (Cultural Resource Survey No. S-677), is known in the project area and insufficient information is available to assess the significance of this site. However, because no professional survey has been conducted in this part of Sussex County, we recommend that archaeological reconnaissance, as defined in 7 CFR Part 656 (Soil Conservation Service Procedures for the Protection of Archaeological and Historical Properties Encountered in SCS-Assisted Programs), be conducted to determine the degree of impact the project will have on cultural resources and to recommend mitigation procedures."

"While we feel that archaeological reconnaissance should be conducted before the preparation of the environmental assessment summary, we recognize that this is not always feasible. For preliminary planning purposes, therefore, adverse effect on archaeological resources can be considered likely if the construction rights-of-way come within one hundred feet of the soil boundaries delineating those well-drained hills indicated on the accompanying maps. Field review by Division personnel in the company of SCS personnel is desirable."

"If archaeological reconnaissance is not conducted prior to the preparation of the environmental assessment summary, the negative declaration for the project should contain an explicit statement of the intention of the Soil Conservation Service to conduct archaeological reconnaissance prior to the beginning of construction."

An archaeological reconnaissance has been conducted by SCS and representatives of the Division of Historical and Cultural Affairs. Before construction begins, a professional archaeologist will be retained to conduct a testing program and prepare a report on the sensitive areas which will be affected by construction of the project.

If the investigation and report indicate that significant prehistoric cultural properties are present, the State Historic Preservation Officer, the National Park Service, and the Advisory Council on Historic Preservation will be advised. Recovery, protection, or preservation of any artifactual material will be performed in accordance with the Archaeological and Historic Preservation Act (PL-291). If no significant resources are discovered

during the survey, arrangements satisfactory to both the State Historic Preservation Officer and to SCS and the sponsors will be made for surveillance of construction operations. Should a discovery of significant artifactual materials be made during construction, work will be stopped and the Chief Archaeologist, National Park Service, Atlanta, Georgia, will be notified and the provisions of the Archaeological and Historic Preservation Act (PL-291) will be followed.

Since this is a federally assisted local project, there will be no changes in the existing responsibilities of any federal agency under Executive Order 11593 with respect to archaeological or historic resources.

Alternatives

Various amounts of land treatment, nonstructural, and structural measures were weighed in the development of alternatives for consideration in this measure plan. Flat topography in the watershed does not permit use of floodwater storage structures to prevent flooding of the agricultural lands. Excavated impoundment sites would intercept the high water tables and afford no storage for floodwater; energy and equipment costs for dewatering such sites would greatly exceed any benefits derived, and an interconnecting system for movement of floodwater from the problem areas would require construction of a channel or floodway. Combinations of tile and open ditch drainage systems are more expensive and would create more unavoidable adverse impacts than the planned approach.

Land treatment measures are needed to attain full benefits of the planned channel work. These are to be installed by individual landowners as components of a conservation plan developed by the landowner in cooperation with the Sussex Conservation District and designed to meet the conservation need for his operation. A land treatment only approach to solution of the local problems is not feasible because the needed measures will not operate satisfactorily without adequate drainage outlets. The same is true of the on-farm land treatment measures to be included in the landowner's conservation plan.

Nonstructural measures were considered to remove the measure-induced increase in flooding along Route 26. The state's proposal to dredge a navigation channel from Route 26 to Holland's Point would have reduced the problem to a large extent, but the proposal raised environmental concerns and was dropped. The state now plans to replace the bridge and remove the flooding hazard from future with-project peak flows.

The Environmental Quality Plan, NED Plan, and two additional plans are discussed herein. The No Action option is also discussed.

Plans A¹, A², and the Selected Plan could be implemented under existing authorities and would address the sponsor's objectives and include environmental enhancement measures such as reduction of erosion rates and sediment delivery. Water quality would be improved; management options would be broadened to permit use of conservation cropping systems which include

practices beneficial to both the human and natural environment. Alternative A¹ is considered to be the NED Plan. Alternative A² includes a mix of open channel and subsurface drainage measures. Although this plan would meet substantially all of the sponsor's objectives, the benefit-cost ratio is substantially reduced and adverse effects are markedly increased.

The Selected Plan meets the sponsor's objectives to provide for adequate drainage and flood prevention in the watershed. Erosion rates will be reduced through use of management practices not available under current conditions. Environmental enhancement will result from the reduction in erosion rates and sediment delivered to the system. The effect of this project on the human environment is expected to be beneficial.

The Environmental Quality Plan would include some channel work to permit the reduction of erosion rates on wet cropland areas where recommended management practices cannot be used under existing conditions. Five miles of wooded areas would be bypassed to preserve existing habitat, and 20 grade control structures would be installed to maintain current water levels. Construction would be phased over a multi-year period to reduce construction impacts on wildlife habitat. Discriminate pruning of tall, woody materials and one-sided construction would be used together with plantings of hedgerows and wildlife materials to preserve and establish wildlife habitat. Sediment basins and flow modification structures would be used instream to improve aquatic habitat and wetlands. Legal and financial constraints would need to be resolved satisfactorily to permit implementation of this plan.

Election of the No Project alternative would remove the impacts expected to occur as a result of the planned action. It is expected that the flooding and drainage damages would increase. Competition for important farmland for non-agricultural purposes would continue. Wildlife habitat quality would decrease very slightly. Management options in the use of land, labor, and capital would continue to be limited. Annual benefits of \$48,900. would be foregone.

ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

The project area has been used for agricultural production since colonial times. Tax ditches have been operational under Delaware Law since the early 1800's in this area. Planned action will restore drainage efficiency to the system of about 43 miles of tax ditches which drain the agricultural land.

An interdisciplinary team evaluated the area during the planning process to assess the effects of project action on existing resources. The following environmental concerns were raised by interested parties, and were addressed by the team. A summary of the expected effect of project action in terms of these concerns is included in this section.

- Erosion and sedimentation
- Water table alterations
- Change in flow regime
- Changes in land use
- Changes in air quality
- Migration routes
- Upland wildlife habitat
- Woodland habitat
- Stream fisheries including potential not presently productive
- Wetlands
- Rare or endangered animals and plants
- Man-altered perennial and intermittent streams
- Archaeological and historical resources
- Water quantity
- Water quality, including receiving waters
- Appearance of the landscape
- Socio-economic

Erosion and Sedimentation

The principal effect of the project action on erosion and sedimentation in the watershed will be lowering the erosion rates on 1,200 acres of wet soils presently used for cropland. While these soils are used successfully for crop production, the management options are constrained by the soil wetness limitation, and conservation practices to reduce erosion rates cannot be used. The wetness condition deters use of no-till farming and cover crops and often limits harvesting of soybeans.

Removal of excess water from the soil profile will allow rainfall to infiltrate. The soil permeability is herein characterized as changing from "very slow" to "moderate" to permit use of the Figure 3 Nomograph in the SCS Technical Note - Conservation Planning 1-78, July 1978. Additionally, the cropping system is changed from continuous soybeans or early corn-late soybeans to a longer based rotation with which management practices can be used to reduce erosion rates and protect the soil resource base.

Evaluations show that erosion rates can be reduced from 3.8 tons per acre per year to 1.2 tons per acre per year on the 1,200 acres of wet cropland soils. The remaining 1,900 acres can be similarly protected and erosion rates reduced where the need exists.

Research at the USDA Sedimentation Laboratory, Oxford, MS, indicates a sediment delivery ratio of 0.97 for a study on similar conditions. Using this delivery ratio a reduction of about 3,000 tons of sediment per year could be achieved.

Construction activities will cause perturbation of the wet soils and suspended sediment concentrations will increase during the construction period. Turbidity levels are also expected to increase during the period.

Changes in Land Use

The project is expected to encourage conversion of some scattered areas of economically marginal agricultural land to residential, forestland, and other uses. With adequate drainage of more productive soils, these scattered, small areas are no longer economical to use for production and will become available for other uses. The potential to improve yields will be enhanced and with the expected increase in irrigation of corn after the project is installed, greater stability in the mix of current land use will result.

Changes in Air Quality

No change in air quality is anticipated. The area is almost completely agricultural. The work will produce about the same odors, particulate matter, and sounds as agricultural operations produce. Most of the soils through which construction will pass are excessively wet and no dust will be produced.

Upland Wildlife Habitat

Quality of upland wildlife habitat appears to hinge on the presence of hedgerows. Assessments indicate that if all hedgerows are removed, quality could decrease by 5.0 percent; if all are retained or replaced, quality could improve by 3.7 percent. Past experience indicates that neither of these extremes will be reached.

Maintenance options such as seasonal mowing of one side of the channel at specified intervals could be used to reduce effects which could be adverse. Discriminate pruning of existing hedgerows could be used to facilitate construction, to reduce hazards to channel banks after construction, and to retain part of the existing habitat.

Migration Routes

The project area is located within the eastern seaboard flyway for migratory birds and waterfowl. The area will continue to be an agricultural community and no changes will be made which would cause alteration of migration routes.

Fishery Resources

Evaluation of the fishery resources followed the principles developed for use in the Sacony Creek Watershed in Pennsylvania. The results of the

evaluations are consistent with those of similar projects reported in the EIS for the Marshyhope Creek Watershed and Upper Choptank River Watersheds. Studies in areas where like work has been completed are reported in Evaluation of the Effects of Channelization on Small Coastal Plain Streams of Maryland, by Speir, Harley; Weinrich, D.R., and Carter II, W.R.; Fisheries Adm. MDNR, July 1976.; and An Assessment of Economic and Environmental Effects of Completed PL-566 Channel Modification Projects in Worcester and Wicomico Counties, Maryland, by Ecol. Sciences, Inc., 133 Park Street N.E., Vienna, VA 22180, August 1976. These show that the project will probably have a beneficial effect on the fishery.

Wetlands

The wetlands were typed in accordance with USDI Circular 39. Types 1, 2, and 5 occur naturally in the watershed. There are no large areas of Type 2. Type 5 is typical of ponds in the area and deep water areas in existing ditches. About 17 acres are currently present; about 22 acres will be present in 1990 with the project installed. Small transitional areas of Type 6 may occur in ruts in Type 1 areas after a logging operation and Type 7 may occur as small isolated areas in woodland on poorly drained Pocomoke soils. The principal effect of the project on wetlands will be the creation of a mix of Types 3 and 5 in the channel. Type 3 is expected to be produced at the upstream end of road culverts. Type 5 wetlands will be produced by construction of the sediment traps and may evolve into Type 3 during the project evaluation period. Type 5 wetlands will also be created at the downstream end of road culverts.

No significant impact is expected on existing wetlands as a result of the project.

Rare and Endangered Species

No known or proposed rare or endangered species are known to be present; however, the U.S. Fish and Wildlife Service reports that bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*) on occasion may pass through the area. Based on present information, they believe the project is unlikely to affect these or other listed or proposed species under the agency's jurisdiction.

No significant effects are expected on these resources.

Man-Altered Perennial Streams

All streams in the Pepper Creek Watershed are either man-made or man-altered. Agriculture has been practiced in the watershed for about 250 years and drainage measures have been needed to enhance the potential for crop production.

The character of perennial streams will be changed by project action; the length will be increased from 8.6 miles to 17.0 miles. Standing water will be reduced from 18.9 miles to 5.0 miles.

Man-Altered Intermittent Streams

Intermittent streams will be changed from 5.2 to 5.0 miles; so no significant change will be made. These are also a part of the man-made or man-altered drainage system which has been operational for a number of years. Ephemeral streams will increase from 10.3 to 16.0 miles.

Archaeological and Historical

A review of the National Register of Historic Places reveals that no entries would be affected by the proposed action. No sites or structures considered eligible for listing will be affected by the project.

Well-drained hills near the project are considered to be archaeologically sensitive, and one site, 7S-K-12 (Cultural Resource Survey No. 5-677), is known in the project area. Insufficient data is available to assess the known site, however. An archaeological reconnaissance as defined in 7 CFR Part 656 is recommended to determine the degree of impact the project will have on cultural resources and to recommend mitigation measures. A reconnaissance by SCS and representatives of the state Bureau of Archaeology and Historic Preservation located some sensitive areas in the project area. Before construction begins, the areas to be affected will be investigated by a professional archaeologist and a report prepared.

Water Quantity

Completion of the channel work in this project will result in lowering of the adjacent water table as much as three feet up to 150 feet to each side of the channel. Improvement of channel efficiencies could increase downstream peak discharge rates and will prolong base flows from the watershed due to temporary storage of rainfall in the soil profile.

The overall effect of project action is not expected to significantly change water quantity from the data recorded on the USGS stream gage at Dagsboro between 1962 and 1975.

Water Quality

The project is not expected to have significant effect on water quality beyond the effects of reducing erosion rates. Turbidity levels and suspended sediment concentrations will increase during the construction period, but are expected also to stabilize and then recede to levels somewhat below pre-project levels after installation is completed. Revegetation of ditch banks, development of bankside cover and use of sediment traps should reduce the levels expected as a result of construction activity. Parameters monitored during the 10-year period are generally within the range of levels for similar watersheds in Delaware, except chlorides. EPA has not set a recommended allowable limit on chlorides for water other than drinking water. The drainage from this basin is discharged into the Indian River Bay which is saline.

Construction is not expected to introduce new substances into the system nor any new levels except as previously discussed.

Although the ditch system will transmit water quality components downstream more efficiently due to improved drainage efficiency of the system, no significant change is expected in the levels of the parameters commonly associated with agricultural operations. In similar watersheds, levels of N and P in areas where channels have not been constructed and agricultural activity is low, are about the same as the levels in areas where channel work has been completed and agricultural operations have resumed.

Appearance of the Landscape

The project area is an 8.5 square mile drainage basin which is typical of farmland in southern Delaware. The topography is flat and the vista is shortened by trees or other projections above eye level at some locations.

No significant effects on appearance of the landscape are expected as a result of project action except at some road crossings where openings may appear abrupt. Some vegetative materials will be removed and others will be established but the overall landscape will remain essentially the same.

Construction through woodlands and vegetative strips along the channels will provide some visual diversity but is not likely to cause significant change in landscape quality.

Socio-Economic

Both direct and indirect effects will occur on the social and economic conditions in the project area. Some benefits are expected to spill over into the Delmarva region. A principal effect will be to provide a wider array of management options to permit farmers to employ land, labor, and capital more efficiently, and extension of the life and utility of these resources will be realized.

Public benefits will accrue through an increase in land values and its effect on the resource base; a decrease in competition between farm and non-farm jobs as a result of increased farm income; providing 7.8 man-years of employment during construction, and 1.6 man-years of seasonal employment annually as a result of operation and maintenance activities; an improvement in quality of life through a reduction of flooding frequency and improvement of the environment.

Minority groups and low income persons are expected to benefit from this project as a result of improved drainage outlets for the areas in which they live. Provisions for adequate drainage and flood prevention will remove standing water from yards and driveways, and the roadways which serve the area. With such physical improvements, community improvements can be implemented and the overall community life enhanced. No demographic or civil rights impacts are anticipated.

ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

1. Temporary increase in turbidity levels and suspended sediment concentrations during the construction period.
2. Temporary loss of wildlife habitat through hedgerow removal.
3. Increase in peak rates of runoff in downstream area.

Alternative Planning Considerations

The development of alternatives did not extend to the selection of a specific mix of conservation practices to be applied on individual units of land. These are to be determined during preparation of a conservation plan by the landowner in cooperation with the Sussex Conservation District. These practices will result in both economic and environmental benefits. Open drains, for example, provide economic benefits in facilitating agricultural operations; environmental benefits are realized by a reduction of erosion rates through a change permitted in the manager's choice of management alternatives. No-till farming and cover crops can be used where adequate drainage is provided and also provide economic and environmental benefits. No-till farming reduces energy, equipment, and labor requirements as well as reducing erosion rates. Cover crops reduce erosion rates and improve both soil tilth and its water holding capacity.

Each of the alternatives considered included a mix of economic and environmental enhancement measures. Drainage measures are considered to be beneficial both environmentally and economically. The principal environmental benefit is to water quality and aquatic ecosystems which are affected by sediment and any adsorbed agrichemicals. Economic benefits accrue primarily from protection of the resource base by reduction of erosion rates and retention on-site of any sediment adsorbed agrichemicals. Moreover, the Ecological Sciences, Inc., report^{1/} indicates a somewhat favorable effect of drainage on instream fisheries. A report^{2/} by the Maryland Fisheries Administration is supportive of the Ecol. Sciences, Inc. report. Studies reported by Erwin McIntosh^{3/} indicate that drainage must be provided before wildlife management of certain upland species can be undertaken successfully.

Economic development and environmental enhancement measures such as those reported in the Delmarva River Basin Study were considered in developing alternatives. Many included in the study report are required by law such as those relating to endangered species and archaeological and historical resources. Others require specific consideration by agency policy such as refraining from draining Types 3 through 20 wetlands. Consideration of fish and wildlife resources and provisions for their establishment and enhancement are standing SCS policy in working with landowners in developing conservation plans on individual units of land.

^{1/}"An Assessment of Economic and Environmental Effects of Completed PL-566 Channel Modification Projects in Worcester and Wicomico Counties, Maryland, Ecological Sciences, Inc., August 1976.

^{2/}"Evaluation of the Effects of Channelization on Small Coastal Plain Stream of Maryland", Harley Spier, et. al., Fisheries Administration, MDNR, July 1976.

^{3/}McIntosh, Erwin, "The Upper Long Marsh Ditch and Tributaries, its Management and Effects on Wildlife of the Caroline Plantation", Queen Anne's County, Maryland, 1978.

While drainage measures are generally considered to be favorable to economic development, their value to environmental enhancement through water quality improvement has not been addressed in detail. Drainage measures are therefore considered to have value as a part of the Environmental Quality Plan as well as in the NED plan. This premise is sustained in the study by McIntosh^{1/} and in application of the Universal Soil Loss Equation.

Provisions for adequate drainage permits a broader range in management options including a change in conservation cropping systems. Changing from the conventional corn-soybeans rotation used under existing conditions to a similar rotation using no-till farming and cover crops permissible after adequate drainage is provided will result in a reduction in erosion rates from four to one ton per acre per year.

A report in the Proceedings of the Third Annual Sedimentation Conference in 1976 showed a delivery rate of 0.97 for a study area in the Mississippi Delta. The study area was used to produce continuous cotton on a nearly flat slope, and was somewhat similar to Pepper Creek. Using this delivery rate on the 1,200 acres of cropland affected would result in a reduction of about 3,000 tons of sediment per year as a direct effect of drainage and conservation measures.

Other structural measures were not considered due to impracticability of their use or because of the cost. The flat topography provides no impoundment sites, therefore, floodwater retarding structures are not appropriate. Since the problem involves both outlet and tributary systems, pumping is not a feasible proposal to remove the excess water. Excavated storage areas would intercept the high water tables and provide little available storage volume; the costs in energy and equipment for dewatering would be prohibitively expensive. A combination of subsurface drains and open channel would be more expensive and greatly increase unavoidable adverse impacts on the environment.

Non-structural Measures:

Nonstructural measures are used to alleviate flood losses by modifying the susceptibility of land, people, and property to flood damage and to change the impact of flooding on individuals and the community. Such methods include floodway acquisition, relocation of existing properties, floodplain easement, flood warning, and flood proofing. Such measures relate, however, to watersheds with floodplains in the traditional sense where excess runoff from the upper reaches of the watershed converges in the downstream areas and causes flooding damages.

Typical of small coastal streams in Delaware, Pepper Creek has flooding problems on the flat farmland in the upstream part of the watershed. Downstream damages are negligible during runoff events more frequent than the 100-year storm. Thus, conventional non-structural measures would not be applicable in terms of eliminating flooding damages.

The 100-year floodplain terminates between Route 26 and Highway 113. Relocation, acquisition, and flood proofing were considered as propositions to remove the present and project-increased flooding along Route 26 in Dagsboro. These would not, however, be appropriate means to solve the major problem of flooding and poor drainage on agricultural land, nor would such measures reduce the damages to roads and bridges in upstream areas.

Land Treatment:

Land treatment measures are required in order to attain full benefits in the project measure area. Since the success of the needed land treatment measures depends upon adequate drainage outlets, the measures will be installed either concurrently with or after installation of the planned channel work. The needed measures are to be installed as components of a conservation plan prepared for the individual landowners in cooperation with the Sussex Conservation District.

A land treatment only plan for the watershed would not be feasible since the measures required will not operate satisfactorily without adequate drainage outlets. On-farm measures alone would not provide significant flood protection or drainage benefits without the outlet channel work.

Alternative A¹

Alternative A¹ is considered to be the plan which emphasizes national economic development. The plan would include work along the entire 43-mile system. All of the work shown in the selected plan would be performed and the remainder of the system would be brought back to its best efficiency. Associated land treatment measures and measures for environmental enhancement would be developed for individual units of land and applied as part of a conservation plan.

Two hundred acres of agricultural land would be affected in the installation of the channel work; 5.6 miles of man-altered perennial stream would be affected; some hedgerows would be lost during the first growing season. Suspended solids concentrations and turbidity levels would increase during the construction period along the channel segments where work is performed. Erosion rates would be reduced on 1,200 acres of cropland as a result of the expected change in conservation cropping systems applied. Sixty-four hundred acres of upland wildlife habitat would be affected. Type 5 wetlands in the channels would increase from 17 to 22 acres. The benefit-cost ratio for this plan is estimated to be 2.0 : 1.0.

Alternative A²

Alternative A² would include channel work along 28 miles of the system and use of 15 miles of subsurface drains on selected laterals. Associated on-farm drainage measures included would be mainly subsurface drains. Environmental enhancement measures would be used as appropriate.

Agricultural operations would be made more efficient by reduction of the number of open ditches; energy conservation would be realized by the reduction of the frequency of turns during farming operations. This alternative would eliminate 2.5 miles of perennial streams, and 12.5 miles of intermittent and ephemeral streams with their associated aquatic and wildlife habitat. Eleven acres of Type 5 wetland would be lost; 6,250 acres of upland wildlife habitat would be affected and 70 acres lost. Turbidity levels and suspended sediment concentrations would be increased along 28 miles of channel during the construction period. Erosion rates would be reduced on 1,200 acres of cropland during the evaluation period due to the expected change in the conservation cropping systems to be applied. Landscape diversity would be reduced on 2,000 acres of agricultural land.

The benefit-cost ratio for this alternative is estimated to be 0.4 to 1.0.

The Selected Plan

The Selected Plan includes 30 miles of channel work with the associated on-farm drainage measures and some environmental enhancement measures.

Some hedgerows will be lost during the first growing season; 3.8 miles of perennial stream will be affected by the channel work; turbidity and suspended solids concentrations will be increased during the construction period along 30 miles of channels; erosion rates will be decreased on 1,200 acres of cropland due to changes permitted in the conservation cropping system by adequate drainage; Type 5 wetlands in the channels will be increased from 17 to 22 acres; 5,085 acres of upland wildlife habitat will be affected.

The benefit-cost ratio for this alternative is 2.1 to 1.0.

Environmental Quality Plan

The Environmental Quality Plan would include 25 miles of channel work; 20 grade control structures; 5,000 feet of diversions; in-stream sediment traps and flow modification structures; and a mix of measures selected from the Delmarva River Basin Study report and the local SCS Technical Guide to further enhance the environment.

Five miles of woodland areas would be bypassed and the grade control structures installed to maintain existing water levels. The diversions would be located and constructed to divert runoff onto the bypassed woodland areas to maintain the existing flooding frequency. The sediment traps would serve to create a mix of Types 3 and 5 wetland areas in the channels; the flow modification structures would also enhance creation of Type 3 wetlands and provide diversity in the characteristics of the low flow pattern in the channels. Multi-year construction would be used on each tax ditch system to retain continuity in wildlife habitat. Discriminate pruning of large, woody materials would be performed, and one-sided construction used where appropriate to preserve wildlife habitat and

maintain structural integrity of the channel systems. Adapted plantings would be made to establish hedgerows and wildlife areas where none now exist and to enhance quality of existing and modified systems. The area between Highway 113 and Route 26 would be evaluated and measures for its enhancement applied. Such measures could include discriminate pruning, and clearing and snagging to be performed by hand labor.

This alternative assumes that legal and financial constraints could be overcome and that affected landowners would cooperate to permit acquisition of about 250 acres of agricultural land to permit retention of the woodland areas bypassed and the construction of the diversions needed to maintain the current flooding frequency. Erosion rates would be reduced on 1,200 acres of wet soils due to a change in the conservation cropping system permitted by providing adequate drainage, and about 3,000 tons of sediment and any adsorbed agrichemicals would be retained in place. A mix of Types 3 and 5 wetlands would be created in the channels by the sediment traps and flow modification structures. Hedgerows with interspersed areas of other beneficial wildlife materials would be established or retained along 25 miles of channels.

Turbidity levels and suspended sediment concentrations would increase during the construction period.

The benefit-cost ratio of this alternative is estimated to be 0.60 to 1.0.

No Project - Future Without Action

The most reasonable alternative to the proposed action is the No Project option. Topography and the efficiency of the existing drainage system does not permit channel flows to begin until flooding of the agricultural lands has already occurred. High water tables created by impeded drainage in the man-made channels can be removed most effectively by channels constructed to the planned elevations. Depth required for drainage, and stability requirements for the soils involved required the planned channel conformation. The resulting size of channel provides the flood prevention level desired at most locations.

Election of the No Project alternative would remove the impacts expected to occur as a result of project action. Wildlife habitat quality, however, would decrease by 0.1 percent due to a reduction in diversity if no action is taken. Competition for important agricultural land for non-agricultural purposes would continue. Management options in the employment of land, labor, and capital would continue to be limited. Annual benefits of \$48,900 would be foregone.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND
MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The project area has been agriculturally oriented since colonial times. No change is expected within the foreseeable future. No change of significance is expected in land use within the area during the life of the project.

Both short-term and long-term uses of the agricultural cropland are anticipated to be supportive of the Delmarva poultry industry and directed to the production of feed grains such as corn and soybeans. Short-term uses under existing conditions are considered detrimental to long-term productivity of such crops. Land with high production potential is limited in use by impaired drainage. Flooding which results one or more times annually further reduces drainage efficiency of existing systems by movement of sediment and other debris into the drainageways. The net effect is the gradual loss of productive land and the need to use more inputs of labor, energy and capital to try to sustain production.

Forestland management is hampered by the same poor drainage conditions. Seedling survival is materially reduced for most species of trees which can be profitably managed. Stand composition is generally the result of natural selection under existing conditions. Red maple and sweet gum often dominate the stands.

The present tax ditch system has done little to rectify the problem of poorly drained forest land, and only those areas directly adjacent to the ditch rights-of-way have benefited. Improved drainage of these areas is needed, not for present stands of trees, but for future ones. With drainage, presently poorly drained areas support the more desirable dry-site species. This transition would probably encompass at least 100 years through natural evolution. The project will provide opportunity for drained areas to be converted readily by artificial means, and with a rapid change in tree species.

The impact of forest land drainage of wet loblolly pine sites can be dramatic. Draining younger stands of loblolly pine will improve their vigor and annual increment of growth, allowing the production of higher quality and quantity forest products to increase the dollar value of the site. Drainage of these wet sites will also improve the potential for natural regeneration of this species. Further drainage will increase tree vigor, therefore making loblolly less likely to fall prey to disease and insects, particularly southern pine beetle. Improvement of the growth and vigor of the trees will allow production of higher quality and quantity of forest products. Drainage of forest land within the Pepper Creek Watershed is needed for improved growth and vigor of not only loblolly pine, but also for desirable hardwoods.

Land which is economically marginal for agricultural production is used to produce crops in order to sustain the farming operation. These areas are too small, poorly located, or have soils not well-suited to intensive use,

but are used for row crops to attain a desired gross income level. Inputs of labor, energy, and capital expended during the cropping cycle are disproportionate on these areas when compared on a per acre basis with similar, more productive land in the area. Land that has greater production potential, but with its use currently restricted by drainage and flooding problems, is often sold for non-agricultural purposes in order to supplement farm income during lean years. These uses are also frequently affected adversely by flooding and poor drainage. Residences on these sites are commonly degraded by frequent flooding and high water tables created by inefficient drainage channels.

The planned drainage channels will provide adequate drainage for the cropland and forestland. Long-term benefits will accrue to the regional economy and the human environment as a result of the planned work. Long-term productivity will be enhanced through the broader array of management options available to local managers through improved drainage and reduction of the frequency of flooding. Yields of feed grain crops can be increased significantly if landowners select and use proper options for increased production. Yields of forest products can be increased by planting of more productive species.

The economically marginal land can be released from the production cycle to other purposes for which it is better suited. It is expected that after drainage, some of the more productive land currently too wet for production will be cleared. Some of the areas not well suited for production will revert to forestland by natural succession or by planting. No significant change in land use is anticipated.

Many sites economically marginal for agricultural production are better suited for residential sites due to size, location and drainage. Disposal of these parcels by sale would not materially affect the production base by many farming units once adequate drainage and flood prevention are provided. It is expected that some parcels will be converted to residential sites and that these will be an improvement in quality over typical sites currently available.

Provisions for adequate drainage and reduction of the flooding hazard will permit crop diversity and provide some additional strength to the local economy. Forage crops require drainage and are needed for animal husbandry enterprises. Relatively dry sites are needed for poultry houses. Pome and other fruit culture requires adequate drainage as do truck crops; these have a potential for increased production.

The human environment will be improved through removal of health hazards caused by frequent flooding of septic systems and water supplies. Hazards to life imposed by flooding of roads and bridges and disruption of daily traffic and commerce will be measurably reduced. Future inhabitants will have greater opportunity for alternative choices in the community.

The effects described in the measure plan and in this section can be realized through installation of the planned work. These effects can be sustained by the tax ditch organization through implementation of the operation and maintenance plan to be developed for this project.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Flow characteristics of the streams will be modified as follows: Perennial streams will increase from 8.6 to 17.0 miles; ephemeral streams will increase from 10.3 to 16.0 miles; intermittent streams will decrease from 5.2 to 5.0 miles; and standing water will decrease from 18.9 to 5.0 miles.

Residential and commercial expansion is expected to maintain about the same rate of increase experienced over the past ten years. Although no significant development is expected to occur, land available for selection for these purposes is expected to be that which is currently economically marginal for agriculture instead of the important lands with high production potential and greater production efficiencies.

Labor, certain construction materials, and energy expended during construction will be irretrievably committed.

CONSULTATION AND REVIEW

The Pepper Creek RC&D Flood Prevention and Drainage Measure is sponsored by the Delaware Division of Soil and Water Conservation and the Pepper Creek Tax Ditch. The measure will be planned and implemented under the First State Resource Conservation and Development Project which is sponsored by the three county governments, three conservation districts, and four state agencies associated with natural resources.

Following is a chronology of events and participants:

- 9/5/62 Tax ditch petition submitted to the Superior Court of Sussex County via the Sussex Soil and Water Conservation District.
- 7/10/72 Proposal submitted to the RC&D program by the town of Dagsboro, Joseph Kollock, Mayor.
- 9/13/72 Proposal submitted to the RC&D program by the Sussex Conservation District, Alden P. Short, Chairman.
- 10/26/72 Included in the First State RC&D Project Plan.
- 1973-76 Included, then removed in various RC&D Steering Committee annual plans of work.
--Environmental assessments carried out by an interdisciplinary team.
--Field surveys carried out.
--Tax ditch planning performed.
- 11/18/75 Field review preparatory to environmental assessment meeting.
Present: James P. Oland, Biologist, U.S. Fish and Wildlife Service
Douglas Meagley, Biologist, SCS
Richard Bennett, District Conservationist, SCS
- 1/20/76 Environmental Assessment Team Meeting. Present:

Charles Harrington, Eng. Tech., Denton, MD
Doug Meagley, Biologist, Dover, DE
James P. Oland, Biologist, U.S. F&W Service, Annapolis, MD
Helen Fox, SCS, College Park, MD
Hal Scholl, SCS, College Park, MD
Dick Hall, Soil Scientist, Salisbury, MD
Jack Lakatos, SCS, Georgetown, DE
Grady Griggs, SCS, Dover, DE
Dick Bennett, SCS, Georgetown, DE
- 3/25/76 Environmental Assessment Team Meeting. Present:

Ronald Thomas, Div. of Archaeology
Michael Kolman, SCS, Dover, DE
Dick Hall, SCS, Salisbury, MD
Hal Scholl, SCS, College Park, MD
Grady Griggs, SCS, Dover, DE

Dick Bennett, SCS, Georgetown, DE
Hal Stephens, SCS, College Park, MD
Jim Oland, U.S. F&WS, Annapolis, MD
Ken Bessinger, Del. State Planning Office, Dover, DE
Charles Lesser, Del. Div. of Fish and Wildlife, Dover, DE
Charles Harrington, SCS, Denton, MD
Bill Darling, SCS, Denton, MD

- 9/27/77 Tax ditch petition accepted by Sussex District Board of Supervisors.
- 10/18/77 Preliminary report - SCS District Conservationist to the Sussex Conservation District.
- 1978 Included in the RC&D Steering Committee 1978 Fiscal Year Plan of Work.
- 7/78 Review draft of measure plan and environmental impact statement prepared.
- 8-9/78 In-house review of draft measure plan and EIS.
- 8-10/79 Interagency review of draft EIS. Received comments from ten agencies.
- 11/79 - Preparation of responses and consultation with other agencies to
6/80 resolve remaining concerns. Correspondence with EPA, U.S. F&WS, Delaware Division of Fish and Wildlife, and other agencies provided proposed responses to comments on the draft EIS.
- 1/80 Met with U.S. Fish and Wildlife Service at Dover, DE to discuss project, agency concerns, and proposed responses to their comments. Present:
- Otis Fincher, SCS
Grady Griggs, SCS
Dick Bennett, SCS
Vernon Hicks, SCS
John Green, U.S. F&WS
Glenn Kinser, U.S. F&WS
Jill Brankman, U.S. F&WS
- 3/80 Completed proposed responses to agency comments and forwarded them for review by the agencies.
- 5/28/80 Field review of project area by William Muir, EPA, and Grady Griggs, SCS, to discuss location specific proposed actions and resolve agency concerns.
- 6/3/80 Field review of project area by Jill Brankman, David Stout, and Linda Dobson of U.S. F&WS; and Grady Griggs and Dick Bennett of SCS, to discuss location specific proposed action and resolve agency concerns.

The following agencies provided comments on the Draft Environmental Impact Statment:

- U.S. Department of the Army
- U.S. Department of Commerce
- U.S. Department of Energy
- U.S. Department of Health, Education and Welfare
- U.S. Department of the Interior
- U.S. Department of Transportation
- U.S. Environmental Protection Agency
- Office of Equal Opportunity - USDA
- Sussex County Community Action Agency, Inc.
- Delaware Division of Fish and Wildlife

Letters of comments and responses to the comments are included in Appendix C.

APPENDIX A

PEPPER CREEK PROJECT ASSESSMENT

Erosion and Sedimentation

Erosion and the resulting downstream depositions of soil particles are quite visible in a low velocity drainage system such as the Pepper Creek watershed and estuary.

The tidal marshes that rim Pepper Creek as it enters the Indian River Bay are, in part, the result of erosion in the Pepper Creek drainage system. There is a fresh water swamp just upstream from the tidal portion of Pepper Creek.

One hundred (100) years ago, Pepper Creek was an open, navigable waterway from Route 26 at Dagsboro, downstream to tidal open water near Hollands Point. Banks which defined an old channel approximately 75 feet in width can be observed just downstream from Route 26. Channel construction in the drainage system has been going on for about 250 years to support agriculture, housing and transportation. Its effects can be assessed quite accurately as depositions of upstream silt and sediment have formed an alluvial border on the inside of old channel banks and reduced the channel width from 75 to 15 feet. The height of the deposit is 2-3 feet above low flow water levels. Some trees growing in the deposition are 50 years old.

The alluvial area has reduced the drainage capacity of these channels and can be observed along the main channel and major tributaries throughout the downstream one-third portion of the drainage basin.

The Pepper Creek drainage system has been completely reconstructed at intervals of 25-50 years. The cycle of the rate of sedimentation in the Pepper Creek watershed during past years would show on a line graph thusly: the highest point was reached during reconstruction, then dropped significantly for the next 1-5 years. The following 7-10 years would show the line continuing to drop; however, it would begin to level off. During the next 5 years, the line would begin to reverse itself and gradually start to rise. The rate of erosion and sedimentation would continue to rise and nearly approach that caused by reconstruction activities at the start of the cycle because of an increase in the intensity and frequency of flooding.

The Pepper Creek drainage system is typical of many such inefficient systems in the region. Flooding of the nearly flat uplands must occur before the sediment-filled channels begin to operate. Areas which flood sustain fairly high rates in sheet erosion due to flotation of particles from the super-saturated soil. These particles move into the drainageways and settle out and further compound the lack of drainage efficiency.

The most common cropping system practiced in the watershed is continuous soybeans. When the weather conditions permit, corn is added to the rotation.

Using the Universal Soil Loss Equation, the soil loss can be estimated for Pocomoke Soil when continuous soybeans are grown with continuous tillage and

crop residues left and without cover crops. This procedure is shown in Conservation Planning Technical Note 1-78, July 1978, available from SCS in Delaware and Maryland.

A = RKLSCP	A = Erosion Rate = Tons/Acre/Year
	R = Rainfall Factor - 225
	K = Soil Erodibility Factor - 0.28
	LS = Topography Factor - 0.16
	C = Cover and Management Factor - 0.378
	P = Conservation Practices - 1.0

$A = 225 \times 0.28 \times 0.16 \times 0.378 \times 1.0 = 3.8 \text{ Tons/Acre/Year}$

Because of the saturated soils, conservation practices cannot be used to reduce the erosion rates.

The 1,200 acres of wet cropland soils would produce 4,560 tons of sediment per year under existing cropping systems. Studies of a similar area at the USDA Sedimentation Laboratory, Oxford, MS^{1/} indicated a delivery ratio of 0.97. Applying this ratio to the Pepper Creek project would produce 4,420 tons of sediment per year. Although sediment delivery from the remaining 1,900 acres of cropland has not been quantified, erosion rates in similar watersheds average about 3 tons per acre per year and the overall sediment delivery ratio from cropland was estimated at 0.26 in one study by J.L. Hunt, SCS Sedimentation Geologist.

Overbank flow of floodwaters increases bank erosion and increases the sediment load in the channel. The movement of the sediment and other floating detritus into the drainage system results in a further decrease in efficiency of the system when the material settles out. Additional areas are flooded later due to the deposition and the source of sediment and other floating debris is enlarged.

A dysfunctional Pepper Creek drainage system is not only a contributor to increased rates of erosion and sedimentation, but it also prohibits the installation of erosion control practices that could decrease agriculture erosion such as cover crops and minimum tillage.

A functional Pepper Creek drainage system tempers and stabilizes flooding conditions that cause erosion and downstream depositions of silt and sediment. As the system becomes progressively dysfunctional and loses hydraulic efficiency, small problems from flooding become big ones and the removal of upstream soil and deposition throughout the system is one of the symptoms.

The majority of the drainage system has been reconstructed in the past 20 years, but some portions have not been improved for 40-50 years. To decrease erosion and deposition resulting from reconstruction activities as proposed in this project, new slopes and berm areas should be seeded immediately.

^{1/}"Sediment Yields from a Mississippi Delta Watershed", C.E. Murphree, et al., USDA Sedimentation Laboratory, Oxford, MS, 1976.

Along unwooded channel reaches, a vegetated buffer strip of approximately 10 feet should be retained on both sides of the channel. Reverse berms and drop structures should be constructed to control overbank flows. Sediment traps should be constructed in the channel bottom by deepening the channel at selected points. Agricultural practices can serve to decrease the yield rate of erosion throughout the drainage system's construction and reconstruction cycle.

The Pepper Creek project will significantly reduce the amount of erosion and downstream deposits of silt and sedimentation that will occur if the project is not done.

When adequate drainage has been provided, the USLE can be used to show the effects on the erosion rate of drainage and a commonly used conservation cropping system used on Pocomoke Soil. The Soil Erodibility Factor (K) is changed from 0.28 to 0.22 since soil permeability will change when excess water is removed from the soil profile. Conservation measures such as no-till farming and cover crops can be used when the wet soils are adequately drained, and the Cover and Management Factor (C) and Conservation Practices Factor (P) are combined to form a CP Factor of 0.147. The erosion rate, A, then becomes:

$$A = 225 \times 0.22 \times 0.16 \times 0.147 \times 1.0 = 1.2 \text{ Tons/Acre/Year}$$

The annual volume of erosion on the 1,200 acres of soils where adequate drainage is provided would be 1,440 tons per year or 3,120 tons per year less than under existing conditions. Using the delivery ratio of 0.97, the reduction in sediment yield would be 3,025 tons per year from the drained cropland.

Due to the character of the materials which cause turbidity, however, the specific effect of the project on turbidity levels is expected to be an increase in suspended solids. This increase will be caused by construction activity during the excavation of the channels, but it is expected to decrease after construction is completed. Vegetation on the channel banks and in strips along the channels will further reduce suspended sediments. Velocity reduction through the sediment traps will also reduce sediment transport downstream. Use of control inlet pipes where needed and construction of a reverse grade on the berm along the channel through cropland areas will reduce overbank flow and bank erosion.

Water Table Alterations

Reconstruction of the Pepper Creek drainage system will remove an average of 1.5 to 2.5 feet of sediment from the channel in the upper reaches of the watershed. Clearing and snagging and removal of sediment bars will be used at selected locations further downstream to improve drainage efficiencies. Construction will generally follow existing locations; some minor relocation may be done to permit efficient use of farm equipment or to better define farm boundaries.

Channel construction will remove gravitational water from the wet soils profiles to depths up to 3 feet and for distances up to 150 feet from each side of the channel. Removal of the gravitational water will permit infiltration of rainfall into the soil profile, reduce flooding potential, and prolong the duration of streamflow. Management options in the use of conservation cropping systems will be enhanced by the more favorable environment for crop production which will result.

Change in Flow Regime

The average grade in the Pepper Creek Tax Ditch system is about one foot per mile. The downstream portion is steeper than average and the upstream portion is flatter.

The downstream channels are generally adequate to carry design discharges. Some areas are expected to require clearing and snagging in the channel to remove obstructions to flow. The beginning point of construction on each segment where channel work is required will be determined by engineering surveys and design.

In the upstream flatlands that are in open land, the channels will be constructed along the general alinement of existing channels. Some minor realinement may occur to improve efficiency of agricultural equipment use and to better define farm boundaries. Channel depths will be about 4 feet to permit use of subsurface drainage systems where appropriate. The planned channel depths and conformation required to drain the saturated soils provide adequate capacity to remove excess runoff and reduce flooding frequency. Drainage of gravitational water from the soil profile will permit increased infiltration of rainfall into the soil. The temporarily stored water will drain out and prolong flow duration in the affected portions. Flooding frequency and peak discharge rates will be decreased on the average for storms having a 20 percent chance of occurrence (5-year). However, on low frequency storms such as the storm having a one percent chance of occurring (100-year) in a given year, peak runoff rates will increase. This results from an increase in channel drainage efficiency and the hydrologic conditions which contribute to increased runoff.

Changes in Land Use

The Pepper Creek drainage basin encompasses a rural area of southern Delaware. Approximately 45 percent of the basin is in woodland. The woodland areas generally have soils less suited for cropland than those being cultivated. Downstream streambelt corridors are in old growth hardwoods of hickory, maple, beech, and oak. Interspersed among the hardwoods are an occasional Virginia and loblolly pine. The basin soils tend to be excessively sandy and droughty.

Most upstream woodlands are on soils that are excessively wet. The predominant species are younger hardwoods of maple, gum, cherry, and river birch. Where woodlands have not been harvested in the past 25 years, there are numerous loblolly pines. Where harvesting has occurred in recent years, natural woodland succession has been more to low grade hardwood species because of the worsening drainage condition.

Clearing the natural woodlands of the watershed for agricultural uses started in the early 1700's. Most clearing was done in the first 100 years and the ratio between open land and woodland remained nearly static until early 1900's. For the next 25 years, the amount of land in woodland increased, but since the mid '40's the amount of open land has been increasing.

About 51 acres of the forestland and about 58 acres of the cropland are committed to tax ditch rights-of-way. About 18 acres of forestland will be cleared for disposal of woody debris and excavated spoil material adjacent to the channel rights-of-way.

Forty-five percent of the area is in agricultural uses such as crops and poultry growing facilities. Corn, soybeans, and small grains make up 95 percent of the crops grown. The annual growth of the Delmarva poultry industry requires the production from about 2,000 acres of corn and 2,300 acres of soybeans. This watershed will contribute a proportionate share. The potential exists to reduce the straight-line effect of land use change by an increase in per acre yield by installation of this project. Sustained annual yields on well-drained and undrained lands in the watershed are relatively close over a short-term period. However, the harvest on undrained soils is severely limited by poor trafficability, plant diseases, and other factors. Provisions for adequate drainage and flood prevention broaden the management options available. Double cropping, changes in plant varieties and fertilization rates, and use of approved agri-chemicals can be used to advantage and will improve cost effectiveness. Available labor, capital, and energy resources can be employed successfully to increase yields by one-third or more. Use of irrigation after the project is installed can further increase yields significantly. A 1977 study showed a yield increase of 2.5 times while the break-even point for irrigated corn was 86 cents less per bushel.

Poultry buildings, yards, service areas and access roads dot many sectors that were once in open cultivated land. Farming units are small (averaging 75-100 acres including woodlands) and are family operated by people who live on the land.

The town of Dagsboro (population 375) is completely within the drainage basin and one half the town of Frankford (population 635) drains to Pepper Creek. In the decade 1960-70, Dagsboro lost approximately 16 percent of its population and Frankford gained the same amount. Although the towns are only 2½ miles apart, it is believed the in-migration of Frankford was not the result of the out-migration of Dagsboro. Outside the municipal limits of the towns and along the roads within the drainage basin, many single family homes have been built in the past 30 years. Numerous houses and trailers have been placed among young and old growth hardwoods along rural roads. There are a few platted residential developments or trailer parks, but near communities, houses have been built nearly lot to lot. Farm buildings and single family homes and trailers are located close to highways. Trailers and prefab houses are usually clustered.

The Pepper Creek project will not be a factor in downstream land use changes. Single residential homes will continue to be built in both open land and

along woodland ridges, particularly those with good highway access. Highways occupy 100 acres of this watershed.

The project will be a contributing factor in some upstream land use changes. Although the project will permit the use of land agriculturally marginal but currently used for crops to be converted to residential construction, forestland, and other uses, the rate of population growth is not expected to change from that experienced during the past 10 years. Most rural roads are under-used. Less good land is lost to new residential construction if existing roads are used rather than building new roads for a residential development. No significant change is expected in the ratio of cropland to woodland.

The Pepper Creek project will contribute to further expanding poultry growing facilities in what is now woodland and cropland. There will not be any change of consequence in the road system other than to upgrade and improve existing highways.

The drainage basin does not have any significant number of institutional, commercial, or industrial facilities.

Changes in Air Quality

The project area has been agriculturally oriented since colonial times. Work such as will be performed during installation of the works of improvement is done regularly in the area. Dust and odors of the type expected during construction are a part of normal farming operations, so no significant effect in air quality is expected.

Migration Routes

The project area is located in the eastern flyway. Planned project action is similar to work that has been performed throughout the state since at least the early 1800's, so no significant effect on migration routes is expected.

Upland Wildlife

The wildlife habitat in the Pepper Creek Watershed was analyzed using the method developed during the assessment of the Upper Choptank River Watershed. (Whitaker, G.A., and McCuen, R.H., 1975, A Proposed Methodology for Assessing the Quality of Wildlife Habitat, Technical Report, Dept. of Civil Engineering, University of Maryland.) The procedure has now been computerized as described in McCuen and Whitaker, 1975; A Computerized Methodology for Estimating the Impact of Water Resource Projects on the Terrestrial Ecosystem, Proceedings of the 29th Annual Conference of the S.E. Association of Fish and Game Commissioners.

The watershed was evaluated for the purpose of determining the effects of planned work on the quality of upland wildlife habitat.

Openland Wildlife

Thirty-two miles of the planned channel construction occurs in cropland. Woody hedgerows are growing along about 16 miles of this channel while only herbaceous vegetation is found along the remaining 16 miles.

In order to construct the channel, approximately 5.7 miles will need the hedgerows removed from each side of the channel. The remaining 10.3 miles will require hedgerow removal from one side only.

Using the weights and factors in Table 6, a mean weighted value of .5761 was computed for the openland wildlife habitat in the Pepper Creek Watershed.

The quality of the study area habitat was evaluated and projected to 1990 for three alternative states:

1. Without the proposed project.
2. With the proposed project, removed hedgerows not replanted
3. With the proposed project, removed hedgerows replanted

Effects of these alternatives on land use and management were evaluated by the assessment team which included biologists, agronomists, soil scientists, engineers, and general soil and water conservationists. The group concluded that without the project, deteriorating drainage conditions would cause a reduction of cropland acreage of 1.8 percent. The woodland and herbaceous areas would remain about the same or increase slightly.

The mean distances which represent the interspersions of land uses and their corresponding management factors are not expected to change significantly by 1990, as shown in Table 7.

If the project is not completed by 1990, there will be a loss of 0.1 percent in the quality of habitat for openland wildlife. The relatively small loss results from the changes in the cropland and woodland acreages.

Completion of the RC&D Measure will improve drainage so that some herbaceous land will return to cropland. The ditch rights-of-way will be maintained in a high value herbaceous cover. The assessment team concluded that land use by 1990 would be as shown in Table 6.

The most significant impact will be on the degree of interspersions of land uses. Elimination of hedgerows in and along the existing ditches will increase the mean distance to woody cover from existing cropland and herbaceous areas. The average management condition for cropland and woodland is not expected to change significantly during the next 15 years. The herbaceous strip along the ditch will be maintained in high value cover and the approximately 218 acres of new herbaceous land created in the rights-of-way will have an average value of 0.9. This will increase the management value of the herbaceous land as shown in Table 6.

Therefore, if the project is installed and the removed hedgerows not replaced, there will be a 5.0 percent loss in the quality of openland habitat. However,

where only channel deepening and one side hedgerow removal is planned, less loss will occur if the woody plants are cut at ground level leaving the berry vines and herbaceous vegetation undisturbed. Sprouts from the cut trees should then provide good hedgerow type cover the following year.

The weighted habitat value (ac/ac) as shown in Table 6 has been determined by multiplying each of the mean weighted factors by their total respective watershed acreage. The answer represents the ideal habitat needed to support an equivalent wildlife population.

Woodland Wildlife

Using weights and factors shown in Table 7, a mean weighted value of .5304 was computed for woodland wildlife habitat in the Pepper Creek Watershed for present land use management.

As shown in Table 7, the project will increase the woodland wildlife value by 1990 if the project is installed as planned. The mean distances, which represent the interspersation of land use of woodland to herbaceous, will be lessened by the project.

Herbaceous strips planned through large wooded areas will provide greater diversity of habitat and help to offset losses of woodland habitat.

Table 6 - Openland Wildlife Habitat Value in units of the Pepper Creek Watershed with planned construction in 1976 compared to calculated value in 1990 after alternative project completion.

Present				Future Up To 1990					
Land Use Variable	Weight	Unit	Factor	Without Project		With Project As Planned		Project with Hedgerows Planted	
				Unit	Factor	Unit	Factor	Unit	Factor
%									
<u>Quantity</u>									
Cropland	1.0	48.7	0.73	46.9	.71	47.8	.72	47.8	.72
Herbaceous	1.0	4.6	0.54	4.8	.56	5.7	.72	4.7	.55
Woodland	0.8	37.0	0.43	37.9	.42	36.0	.45	37.0	.43
Residential	0.2	9.7	0.18	10.4	.17	10.5	.16	10.5	.16

<u>Interspersion</u>		Distance/ft		Dist/ft		Dist/ft	
Cropland to Woody Cover	4.0	304	.58	304	.58	385	.48
Cropland to Herbaceous Cover	2.0	99	.96	99	.96	95	.98
Herbaceous to Woody Cover	1.2	436	.58	436	.58	472	.55
Woodland to Herbaceous	0.5	347	.09	347	.09	312	.10

Table 6 - Pepper Creek Watershed - Continued

<u>Management</u>		<u>Present</u>	Without Project	With Project As Planned	Project with Hedgerows
Cropland	2.0	.76	.76	.76	.76
Herbaceous	1.0	.46	.46	.74	.74
Woodland	1.0	.49	.49	.49	.49
Total		14.7			
Mean weighted factor		.5761	.5753	.5452	.5981
ac/ac Value		5871.8/3382.7	5871.8/3378.1	5871.8/3201.3	5871.8/3511.9
% Change from Before Project			-0.1%	-5.0%	+3.7%

Table 7 - Woodland Wildlife Habitat Value in units of the Pepper Creek Watershed with planned construction in 1976 compared to calculated value in 1990.

Land Use Variable	Present			Future up to 1990			
	Weight	Unit	Factor	Without Project Unit	Factor	With Project as Planned Unit	Factor
		%					
<u>Quantity</u>							
Cropland	0.4	48.7	.20	46.9	.22	47.8	.21
Herbaceous	1.0	4.6	.58	4.8	.59	5.7	.68
Woodland	3.0	37.0	.57	37.9	.58	36.0	.56
Residential	0.2	9.7	.25	10.4	.23	10.5	.23
<u>Interspersion</u>							
		<u>Distance/ft</u>		<u>Dist/ft</u>		<u>Dist/ft</u>	
Woodland to Herbaceous	3.0	347	.98	347	.98	312	.99
Cropland to Woody Cover	0.5	304	.51	304	.51	548	.11
<u>Management</u>							
Cropland	1.0		.48		.48		.48
Herbaceous	2.0		.58		.58		.79
Woodland	5.0		.38		.38		.38
Total 16.1							
Mean Weighted factor		.5304		.5333		.5643	
ac/ac Value		5871.8/3114.4		5871.8/3131.4		5871.4/3313.4	
% Change from before project				+0.5%		+6.38%	

PEPPER CREEK

Stream Fish Habitat

Pond

The only ponds in the watershed are stocked with bass-bluegill and are not properly managed.

Streams

When farming began about 250 years ago, most waterways were dug to facilitate water removal. Since that time the waterways have been reconstructed periodically.

Where perennial, the streams move slowly through the floodplains. In much of the woodland portion, the existing high spoilbanks and sloping topography combine to prevent the channel from flooding.

The stream bottom consists mainly of sand to a fine sandy material with some decomposing organic material. Areas below road crossings are generally fine sandy material alone.

In the vicinity of sampling stations 23 and 24 (see invertebrate assessment), the stream bottom material consists of organic "ooze". In this area the stream flows on a nearly flat gradient through decaying organic material. A densely vegetated streambank further slows the rate of flow. The remainder of the stream flows through woods dominated by either a red maple-sweetgum-white oak mixture or plantations of Virginia or loblolly pine. Due to prior drainage, white oaks have become established on portions of the poorly drained soil; however, white oaks do occur regularly on the better drained soils.

The fish habitat values for all watercourses were derived by the method developed for use in the Sacony Creek watershed in Pennsylvania as shown on Table 3. Evaluation of the physical parameters by this method indicates that reconstruction of these channels will have a positive, beneficial effect on the fishery.

Tables 4 and 5 show the results of sampling 100 to 180 foot reaches of the Pepper Creek watershed with rotenone. Additional sampling results are available for nearby portions of the Marshyhope Creek and the Upper Nanticoke River watersheds.

Invertebrates

A sampling of benthic and free swimming aquatic macroinvertebrates was collected from the streams of channels where channel work is planned in the Pepper Creek watershed.

The sampling was completed during August 20-21, 1975, at stations where fish had been sampled by rotenone the preceding week.

The principal objective of this study was to investigate the effect of channel work projects on the diversity of macroinvertebrates. This is important in assessing the impact of channel construction work. As part of the environmental assessment of operational and proposed channel projects in Maryland and Delaware, it was necessary to study the effects of channel work on the aquatic ecosystem. This assessment describes only part of the ongoing survey. Comparison data relating to the aquatic ecosystem throughout Delaware will define the positive and negative effects of channel work to the extent that for future projects, detailed studies may not be needed for every project.

Species richness (number of species present) provides an index of the availability of habitat for different species to exist under varying concentrations of oxygen-demanding organic matter.

The Biotic Index of Beck (1955)^{1/} found in Florida that 10 was the lowest acceptable index number for clean water; Station 23 approached 10.

It should be noted, however, that other indices for Stations 23 and 24 are low. The bottom of the streams are composed almost entirely of organic "ooze". The d1 and d2 indices referenced in Odum^{2/} (1971) are additional means of summarizing data on total numbers and total taxa in a single numerical form for evaluation.

The results of the survey included in Table 1 show diversity index values ranging from 0.982 to 3.604. The channels at Stations 22, 23 and 24 were reworked 15 years ago, whereas the channel at Station 21 was cleaned out about one year ago.^{3/}

The EPA manual^{4/} has quoted studies saying, "...that in nonpolluted waters the \bar{d} (Shannon-Weaver Diversity Index) was generally between 3 and 4, whereas, in polluted water \bar{d} is generally less than 1."

Only Station 24 with its shallow water and organic "ooze" bottom has a \bar{d} less than 1. The "ooze" was populated almost exclusively by oligochaetes (sewage worms).

^{1/}Beck, W.M., Jr. 1955. Suggested Method for Reporting Biotic Data. Sewage Ind. Wastes, 27(10): 1193-1197.

^{2/}Odum, Eugene P. 1971. Fundamentals of Ecology. 3rd ed. W.B. Sanders Co. 573 pp.

^{3/}Sampling Station Locations: 21 - Prong 1 @ RD 336; 22 - Main @ RD 405; 23 - Main @ RD 402-A; 24 - Laurel Drain @ Sta 102+00.

^{4/}U.S. Environmental Protection Agency. 1973. Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents. Office of Research and Development, Cincinnati, Ohio. (Macroinvertebrates section 38pp.)

Each of the indices given was tested against the elapsed time since the channel work was completed and the watershed size.^{5/} None of the correlation coefficients given in Table 2 were significant at the 5% level. Other variables including mean channel depth and width and the bottom material were qualitatively assessed, but any relationships with diversity were not obvious. Therefore, channel work in the type of streams studied does not adversely affect the diversity of the macroinvertebrate community.

TABLE 1
Invertebrate Species at Sample Stations

Stations	21	22	23	24
Years since channel work	1	17	17	15
Beck's Biotic Index ^{6/}	17	19	10	27
Shannan-Weaver Diversity Index ^{7/}	3.604	1.790	2.742	0.982

Note: Bottom grab samples were made with an Eckman Dredge. Habitats were searched with small seine and dip nets.

^{5/}Whitaker, Gene A., McCuen, R.H., Brush, J. 1976. Species Diversity of Aquatic Macroinvertebrate Communities in small Delmarve Streams in Relation to Time Since Channelization.

^{6/}Beck, W.M., Jr., pp 1193-1197.

^{7/}U.S. Environmental Protection Agency (Macroinvertebrates Section), 38 pp.

TABLE 2

Correlation Coefficient Values for Years Since Channel Work

Index	Correlation Coefficient ⁸ /	
	Years Since Channel Work	Watershed Area
Shannon-Weaver for total	.119	.160
Shannon-Weaver for Benthic only	.036	-.018
Biotic Index	.267	.109
d ₁	-.047	.158
d ₂	-.240	.371

⁷/Critical correlation coefficient = .381 at 5% level of significance.

TABLE 3

Fish Habitat Value of Streams
on Which Construction Has Been Planned⁹/

	Existing Condition			Future 1990 w/o Project			Future 1990 w/ Project		
	Value	Mile	Value	Mile	Value	Mile	Value	Mile	Value
Perennial	.43	9.7	4.17	5.1	2.19	.44	19.3	8.49	
Intermittent	.25	4.5	1.125	2.9	0.725	.2	3.9	.78	
Standing Water	.1	14.1	1.41	23.3	2.33	.1	7.0	.70	
Ephemeral	.05	9.9	0.495	6.9	.345	.05	8.0	.40	
Total in Area			7.20		5.59			10.37	

Note: All information on flow conditions was derived by random interviews with watershed residents.

⁹/Utilizing methods developed and utilized for Sacony Creek watershed in Pennsylvania by Carl Thomas.

TABLE 4

Fish Species Presented at Sampling Station
Pepper Creek Watershed

	<u>Station 21</u>	<u>Station 22</u>	<u>Station 23</u>	<u>Station 24</u>
Redfin Pickerel	X		X	X
Bluegill Sunfish			X	
Pumpkinseed Sunfish			X	
Banded Sunfish	X	X	X	X
Brown Bullhead	X	X	X	
Yellow Bullhead	X			X
Creek Chubsucker		X		
Golden Shiner				
Swallowtail Shiner			X	
Spottail Shiner				
Unidentified Shiner		X		
Pirate Perch				
Johnny Darter				
Tesselated Darter				
Mud Minnow	X	X	X	X
Tadpole Madtom				
Marginated Madtom				
American Eel	X	X	X	X
Total	6	6	8	5
Month	Aug 1975	Aug 1975	Aug 1975	Aug 1975

TABLE 5

Fishery Data From Sampling Stations
in Pepper Creek Watershed^{1/}
(August 1975)

	Stations			
	21	22	23	24
Parameters:				
Length sample area - ft.	125	125	100	120
Avg. depth - ft.	.393	.213	.600	.378
Avg. width - ft.	7.78	15.56	9.00	8.76
Surface area - ac.	0.022	0.044	0.20	0.024
Percent canopy cover	80	95	20	5
Water temperature	25 C	23 C	22 C	28 C
Bottom type	sand - fine sand	sand - fine sand	muck	muck
Fish - grams collected	605	205	291	334
Fish - No. collected	75	88	113	139
Fish - No. species	6	6	9	5
Surface - lbs./ac.	60.4	9.1	28.7	36.7
Surface - lbs./mi.	56.1	17.0	30.9	34.8
Species diversity d_1	2.67	2.57	3.90	1.87
d_2	0.69	0.64	0.85	0.42

^{1/}Indices of Species Diversity from Odum E., Fundamentals of Ecology; 3rd edition, page 144.

PEPPER CREEK

Wetlands

Selected portions of the Pepper Creek Watershed were researched on the Sussex County Soil Survey Sheets and were then examined in the field. The wetlands were typed according to USDI Circular 39 and summarized as follows:

Type 1 - Seasonal Flooded Basins or Flats

Includes cropland where water often stands in the spring. These cause plantings to be delayed and crops to often fail. Many of the wet spots in the crop fields are obvious from aerial photography. Vegetation typical of Type 3-4 wetland can develop in Type 1 areas in equipment ruts on recently harvested woodland, utility rights-of-way, margins of ponds, and in standing water in constructed ditches.

Type 2 - Inland Fresh Meadow

There are no large areas of Type 2 wetlands. Vegetation characteristic of this type, however, can be found in wet spots on poorly drained cropland and in the bottom of field ditches that do not maintain standing water.

Type 3-4 - Inland Fresh Meadow

No naturally occurring areas of this type are present.

Type 5 - Inland Open Freshwater

Typical types include existing ponds and deep water areas in existing ditches. About 17 acres are now present; about 22 acres will exist after the project is installed.

Type 6 - Shrub Swamp

No naturally occurring areas are present, however, small transitional areas may occur on Type 1 in woodland after a logging operation. Typical vegetation may occur in ruts recently created by logging equipment.

Type 7 - Wooded Swamp

No Type 7 wetland was observed in the watershed. Much of the woodland is on poorly drained Pocomoke soils; therefore, in late spring some small isolated areas of Type 7 may be present. These areas are less than $\frac{1}{4}$ acre in size and are widely scattered throughout the watershed. Previously constructed ditches prevent excessive flooding of adjacent woodland.

Rare or Endangered Animals and Plants

No known or proposed rare or endangered animals or plants are known to be present. Bald Eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*) on occasion may pass through the area. The project is not expected to affect these or any other listed or proposed species. No significant effects on these environmental concerns are expected.

Man-Altered Perennial and Intermittent Streams

There are no natural streams in the Pepper Creek drainage system. Seventy percent of the 5,460 acre drainage basin is between the elevations of 30 and 40 feet above sea level.

Downstream channels have been constructed along crevices bordered by sandy ridges and through marshland to open water in Indian River Bay. Old spoil piles are in evidence throughout the system wherever channels run through woodlands. Downstream channels follow natural topographic meandering. Upstream channels have been constructed much straighter because of a more flat and uniform topography, and to facilitate farming operations.

The proposed Pepper Creek flood and drainage project will consist of reconstructing about 30 of the 43 miles of open channel. New construction will follow old channel alignments in all downstream reaches and where channels go through woodlands in the upstream reaches. Where reconstruction of channels is completely in cropland or along the border between woodland and cropland, straightening will occur where practical.

Reconstruction through woodlands will cause stream temperatures to rise because of the loss of shade. Increases in temperature will be permanent if the system is maintained as planned.

The Pepper Creek system does not have a cold water fishery.

Clearing, excavation, and grading will increase turbidity levels in channel waters within the immediate area of construction. Silt and sediment traps constructed by deepening channel bottoms in selected locations will retain heavier soil particles in proximity to locations where construction takes place. Some lighter soil particles will escape silt traps and reach downstream deposition areas, but will not reach present stream loads caused by flooding. Woody materials suspended in channel flows will increase during construction. Receding waters will permit woody materials to decay within 2-3 years after construction.

Channels within the drainage system have been classified according to flow characteristics. The project will alter the channels as follows:

	<u>Before Project</u>	<u>After Project</u>
Perennial	8.6 miles	17.0 miles
Intermittent	5.2 miles	5.0 miles
Standing	18.9 miles	5.0 miles
Ephemeral	10.3 miles	16.0 miles
	<hr/>	<hr/>
TOTAL	43.0 miles	43.0 miles

Archaeological and Historical

The National Register of Historic Places lists no sites or properties that would be affected. None in the project area where impacts are expected to occur are considered eligible for listing in the register. Archaeological concerns are reported in the attached letter from the State Historic Preservation Officer, Delaware Division of Historical and Cultural Affairs.



STATE OF DELAWARE
DIVISION OF HISTORICAL AND CULTURAL AFFAIRS
HALL OF RECORDS • DOVER • 19901
(302) 678-5314

LAWRENCE C. HENRY
DIRECTOR

December 14, 1976

Mr. Lee Emmons
Division of Soil & Water Conservation
60 The Plaza
East Loockerman Street
Dover, Delaware 19901

Re: Pepper Creek Tax Ditch

Dear Mr. Emmons:

This project has been referred to this office for comment by the Section of Archaeology, as a result of changes in this Division's environmental review procedures. Please refer to the enclosed procedures for future use. These comments, however, are based on recommendations from the Section of Archaeology.

Enclosed is a copy of the preliminary drawings for this project on which areas of high archaeological potential are noted. These areas consist of well-drained hills near the project. Only one site, 7S-K-12 (Cultural Resource Survey No. S-677), is known in the project area and insufficient information is available to assess the significance of this site. However, because no professional survey has been conducted in this part of Sussex County, we recommend that archaeological reconnaissance, as defined in 7 CFR Part 656 (Soil Conservation Service Procedures for the Protection of Archaeological and Historical Properties Encountered in SCS-Assisted Programs), be conducted to determine the degree of impact the project will have on cultural resources and to recommend mitigation procedures.

While we feel that archaeological reconnaissance should be conducted before the preparation of the environmental assessment summary, we recognize that this is not always feasible. For preliminary planning purposes, therefore, adverse effect on archaeological resources can be considered likely if the construction rights-of-way come within one hundred feet of the soil boundaries delineating those well-drained hills indicated on the accompanying maps. Field review by Division personnel in the company of SCS personnel is desirable.

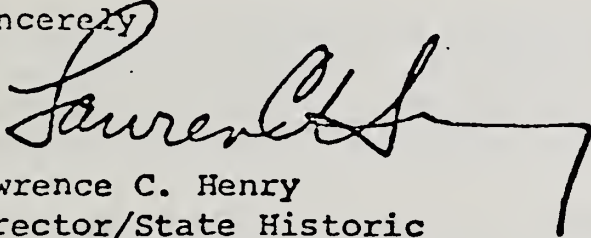
If archaeological reconnaissance is not conducted prior to the preparation of the environmental assessment summary, the negative declaration for the project should contain an explicit statement of the intention of the Soil Conservation Service to conduct archaeological reconnaissance prior to the beginning of construction.

Letter to: Mr. Fincher
December 14, 1976
Page 2

We would appreciate receiving a copy of the environmental assessment summary when it is completed.

We regret the delay in commenting on this project. The recent flurry of review requests as a result of the Local Public Works Capital Improvement Program has caused some delays in the handling of more routine projects.

Sincerely

A handwritten signature in cursive script, appearing to read "Lawrence C. Henry", with a long horizontal flourish extending to the right.

Lawrence C. Henry
Director/State Historic
Preservation Officer

LCH:CLW:pkg

cc: Mr. Otis Fincher

Water Quantity

This 8.5 square mile drainage basin has been monitored by USGS by the gage at Dagsboro during 1962-75. Gage records are available in the USGS Water Supply Papers for that period which embraces the period covered by water quality data shown herein.

Other water quantity measurements have not been made within this watershed during the assessment period. Observations, however, indicate no significant difference over the years either before, during, or after the period in which the gage operated.

In other studies, no consistent pattern has been detected for new or unconstructed drainage subbasins. Inasmuch as this basin includes both unconstructed and constructed segments, no additional or more significant interpretations were anticipated as a result of collecting 1976-77 data.

Construction of the channel work is expected to lower the water table adjacent to the channels about 3 feet up to 150 feet from the channels. Lowering of the water table will permit an increase in infiltration of rainfall into the soil and will prolong base flow from the watershed. Although peak rates could increase as a result of improved drainage efficiency of the system, total flow volume is not expected to increase and could decrease through increased evapotranspiration by crops.

Base flow volume could increase by improving drainage efficiencies, at least for a period of time following a storm. Channel storage and quick return flows will likely have some effect on base flow, but the effect is expected to be positive and would benefit the aquatic community.

Water Quality

Water samples have been taken for the past 10 years by the Delaware Division of Environmental Control at the Route 26 bridge in the downstream portion of the Pepper Creek drainage system. Two tributaries planned for reconstruction enter from the north, downstream from this point.

The following data shows results of the random sampling of the listed water quality parameters:

A. Dissolved oxygen (DO)

The dissolved oxygen levels met or exceeded the state standards of 6.5 mg/l throughout the 10 year sampling period. The oxygen content is adequate to sustain the life of fish and other aquatic organisms and prevention of offensive odors.

B. BOD

At the sampling station near Route 26, the BOD level ranged from 1.9 to 5.7 mg/l during the 10 year sampling period.

C. The pH values of all samples generally met the range (6.5-8.5) established as the state standard. The samples do tend to be low within the state range.

D. Alkalinity

Most samples exceeded the minimum state standard of not less than 20 mg of CaCO_3 /liter. The CaCO_3 content in 1970 and 1971 did not meet the minimum state standard.

E. Acidity

Most samples were within the state standard range whereby the acidity reading will not exceed the alkalinity reading by more than 20 mg of CaCO_3 /liter. Samples taken in 1975 and 1976 had readings between alkalinity and acidity content greater than 20 mg of CaCO_3 /liter.

F. Nitrogen

The Delaware standard for ammonia nitrogen content is .4 mg/l. Samples taken in 1974 (1.3) and 1975 (1.3) significantly exceeded this level and only slightly so in 1977 (.55). The total nitrogen levels did not exceed the state criteria of 3.0 mg/l at any time during the 10 year sampling period.

A recent report prepared by the Coastal Sussex Water Quality Program^{1/} indicates nitrate contamination of groundwater occurs southeast of Dagsboro. Although this area is within the Pepper Creek drainage basin, no construction is planned within the problem area.

G. Coliform

The fecal coliform levels in most samples taken were lower than that established as the state standard for primary contact recreation use.^{2/} The single exception was in 1977 when the fecal coliform content was logged as 210 colonies/100 ml. The total coliform levels, however, showed wide variations and three times exceeded the allowable levels for secondary contact recreation.^{3/}

^{1/}Water Quality Management Plan (draft for public review) Figure 24, dated December 5, 1977.

^{2/}Primary contact recreation use involves prolonged intimate body contact with water where there is a significant risk of ingestion such as swimming and water skiing. The fecal coliform levels shall not exceed a log mean of 200 colonies/100 ml.

^{3/}Secondary contact recreation use involves water as a pleasurable setting for activities in which there is an insignificant risk of ingestion, such as boating, fishing, and wading. The fecal coliform levels shall not exceed a log mean of 770 colonies/100 ml.

The sampling results indicate the quality of water in the Pepper Creek drainage basin is good. This is supported by the Coastal Sussex Water Quality Study. Reconstruction of the drainage system is not expected to alter the water quality of the system. Turbidity levels are expected to increase slightly during construction. It is doubtful that the levels observed will exceed the levels reached during flooding of the streams in Delaware during the fall of 1977, however, flooding, dysfunctional drainage systems and high turbidity levels are synonymous in the Pepper Creek area. Only by reducing velocities resulting from flooding will turbidity levels be reduced. The Pepper Creek flood and drainage project will reduce both the short-term and long-term turbidity levels in the channels of the system.

Random sampling results during the period 11/9/67 to 5/24/76, by the Delaware Division of Environmental Control at the Route 26 bridge.

	11/9/67	3/4/70	11/17/71	3/27/74	2/18/75	5/24/76	2/14/77
Percent of saturation	73	90	-----	91	61	83	87
Dissolved Oxygen, mg/l	8.7	10.8	9.4	9.4	6.9	6.5	10.9
BOD mg/l	3.3	1.9	2.4	4.7	2.5	5.7	4.0
pH	6.9	6.7	6.3	8.5	7.6	7.7	6.4
Alkalinity mg/l CaCO ₃	27	13	10	73	63	103	23
Acidity mg/l CaCO ₃	11	7	11	-----	22	16	8
Hardness	51	50	57	-----	3300	4400	950
Chloride mg/l	21	42	90	12,200	12,500	15,000	1900
Total nitrogen mg/l N	1.1	1.4	0.9	2.0	1.4	-----	1.65
Organic nitrogen mg/l N	0.8	1.3	0.8	0.7	0.1	-----	1.1
Ammonia Nitrogen mg/l N	0.3	0.1	0.1	1.3	1.3	.24	.55
Nitrite Nitrogen mg/l N	0.02	0.01	0.02	.05	.01	0.02	.02
Nitrate Nitrogen mg/l N	0.4	1.5	3.2	0.2	1.0	0.16	1.43
Total phosphate mg/l PO ₄	3.05	2.9	0.2	0.1	.1	-----	0.40
Total coliform #100 ml	2M	6.1M	570	2	9.1	23	24,000
Fecal coliform #100 ml	30	100	20	4	9.1	83	210

Appearance of the Landscape

The Pepper Creek drainage basin is an 8½ square mile watershed that is typical of farmland in southern Delaware. The topography is flat, thus views of the landscape are limited to the first tree line. Cropland scenes from May to October reveal linear rows of soybeans and corn. Farmsteads usually consist of a house, garage, small out-buildings, and poultry houses surrounded by small fields. Most buildings are close to highways.

One small rural community is totally within the drainage basin and another is partially so. Urbanization has been essentially confined to residential buildings along the highways that criss-cross the system. The flat topography has permitted highways, farm fields, and buildings to be located in a somewhat straight and uniform fashion. One landscape scene is not much different from another.

Slightly less than one-half the drainage basin is in woodlands of mixed hardwoods and yellow pine. Approximately 35 percent of all landscape scenes viewed from highways are woodland. Woodlands have an abundant understory of green briars, holly, sassafras, dogwood, and young seedlings of larger species of hardwoods. The depth of view of the woodlands generally does not exceed 25 feet in the summer or 100 feet in the winter.

Cropland scenes have a limited viewshed during the summer and early fall due to the row crop height. During the remainder of the year, extended views are limited by hedgerows and woods around the small fields.

Waterscape scenery is limited to narrow views along channels. Although numerous channels lay perpendicular to highways, vegetative growths restrict any depth of view except in winter months.

Socio-Economic Assessment

Completion of the project will have both direct and indirect effects on the social and economic conditions in the project area. Reduction of the flooding hazard and lowering of the high water table will result in stabilization of yields, potential for diversification in cropping systems, and production of higher quality crops. Farmers will be able to employ production factors of land, labor, and capital more efficiently. Furthermore, the economic life and utility of these assets will be extended through conserving the resource base.

The public will benefit from an increase in land values and its effect on the tax base. An increase in farm income will help reduce the income gap between farm and non-farm employment. An improvement in income opportunities from farming will remove the need for farmers to seek supplemental or alternative employment and limit the competition for non-farm jobs.

The income and employment effects described are indirect. Some direct effect is expected on the labor force. An estimated 7.8 man years of labor will be generated during the installation period. Operation and maintenance

are expected to create an additional 1.6 man-years of seasonal employment annually. Many of these jobs will utilize unskilled or semiskilled people and should provide employment opportunities for low income or minority people.

The project is expected to have no significant effect on the recreation industry. Improved farm management will permit more efficient use and development of natural resources, however. For example, total farm planning will include measures for conservation of resources such as forests and water, and wildlife management measures as appropriate. With an improvement in income, farmers will be better able financially to participate in such practices, and these will enhance the recreational environment.

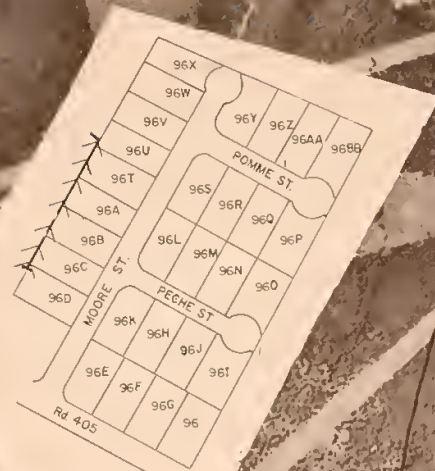
The road system will benefit by improvements to bridges and culverts where reconstructed channels cross the highways and secondary roads, and where flooding of roads will be reduced.

Benefits produced will enhance the economy of the Delmarva region to some extent. Gains in income and employment in the project area will lead to increased income and savings elsewhere within the region. Local secondary benefits induced by and stemming from the measure are estimated to be \$9,000 annually.

Protection from frequent flooding and safety of life will serve to enrich the quality of life and social well-being for local inhabitants. Individuals and the community will benefit from savings in time and other resources should disaster strike and the purchase of insurance to protect their assets will be less difficult. Flooding of septic tanks will be reduced. While specific measurements are difficult, it is generally believed that people's attitudes and behavior become more positive as a result of removal of threatening problems and improvement of the quality of the environment.

Local population is expected to remain stable. Farm families will remain on the farm so long as the opportunity is afforded for earning an acceptable level of income and satisfying other human needs and preferences.

APPENDIX B



- NOTATIONS**
1. Property boundaries were obtained with the use of county tax maps, by consultation with landowners, and by field examination using aerial photographs. Where necessary, deeds were plotted onto photographs.
 2. Farm acreages are shown on an assessment list.
 3. Timber salvage operations are the responsibility of individual landowners and not of the tax ditch.
 4. Construction and maintenance rights-of-way are on side of ditch as indicated by the following symbols:
The long hash marks represent the main construction and maintenance side or sides. The shorter hash marks represent off side construction or maintenance for clearing operations and for equipment travel.
 5. During excavation, spoil will be so placed along all reaches of proposed ditch so that openings will be provided for lateral surface drainage.
 6. Maintenance rights-of-way are to be not less than 25 feet wide from edge of constructed ditch in all cases.
 7. Construction rights-of-way in cropland are to be of sufficient widths to allow for the piling of debris as a result of clearing operations and to allow spoil to be leveled as a part of construction operations, but not to exceed 250 feet perpendicular to the centerline of constructed ditch.
 8. Spoil will be used to fill abandoned ditches providing they are not more than 80 feet from the relocated ditch.
 9. The abandoned ditch will be cleared before filling is done.
 10. In woodland the abandoned ditch, beyond the clearing area, will not be filled.
 11. Construction rights-of-way in woodland are to be of sufficient widths to permit ditch construction to the required size, provide a maintenance road adjacent to the ditch, provide an area for piling spoil, and allow room for piling brush and trees out of the way of excavation and related operations, but not to exceed 80 feet from each side of centerline of ditch.

LEGEND

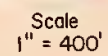
Watershed Boundary	---
Tax Ditch Centerline	---
Approx. Property Boundary	---
Property Code Numbers	(26)
Overhead Electric Lines (DP&L)	S — S — S
Overhead Electric Lines (OEC)	O — O — O
Underground Electric Lines (OEC)	E — E — E
Underground Telephone Lines (DST)	U — U — U
Overhead Telephone Lines (DST)	T — T — T
Water Lines	W — W — W
Connected Areas	Z

PEPPER CREEK TAX DITCH
SUSSEX COUNTY
DELAWARE

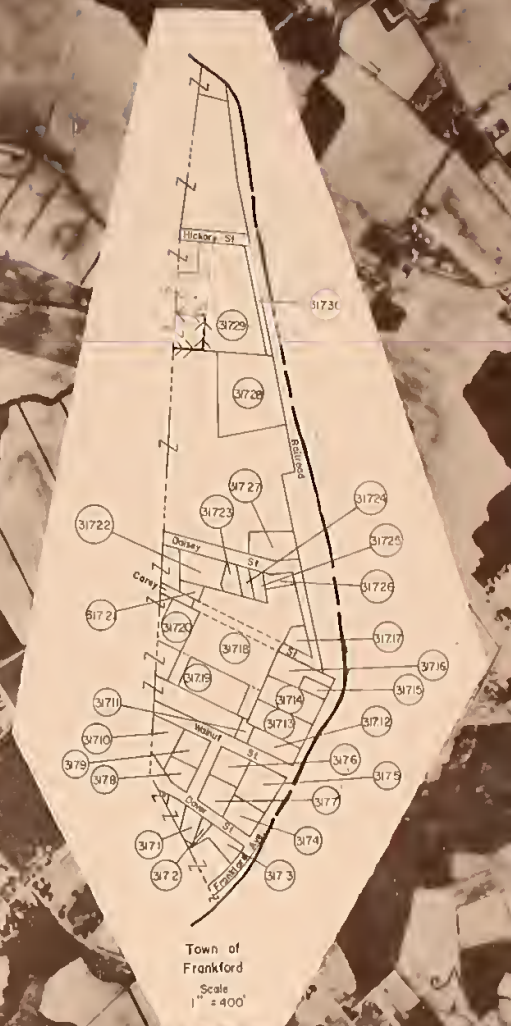
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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Date		Approved by	
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Traced R. Enright		Sheet	Drawing No
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PEPPER CREEK TAX DITCH
SUSSEX COUNTY
DELAWARE

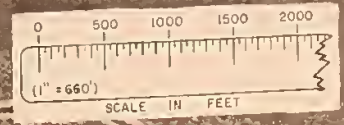
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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John L. Emmons, Jr., Soil Conservation	
and D. G. G. R. Knight	
Checked by	Drawing No.
John L. Emmons, Jr., Soil Conservation	2077

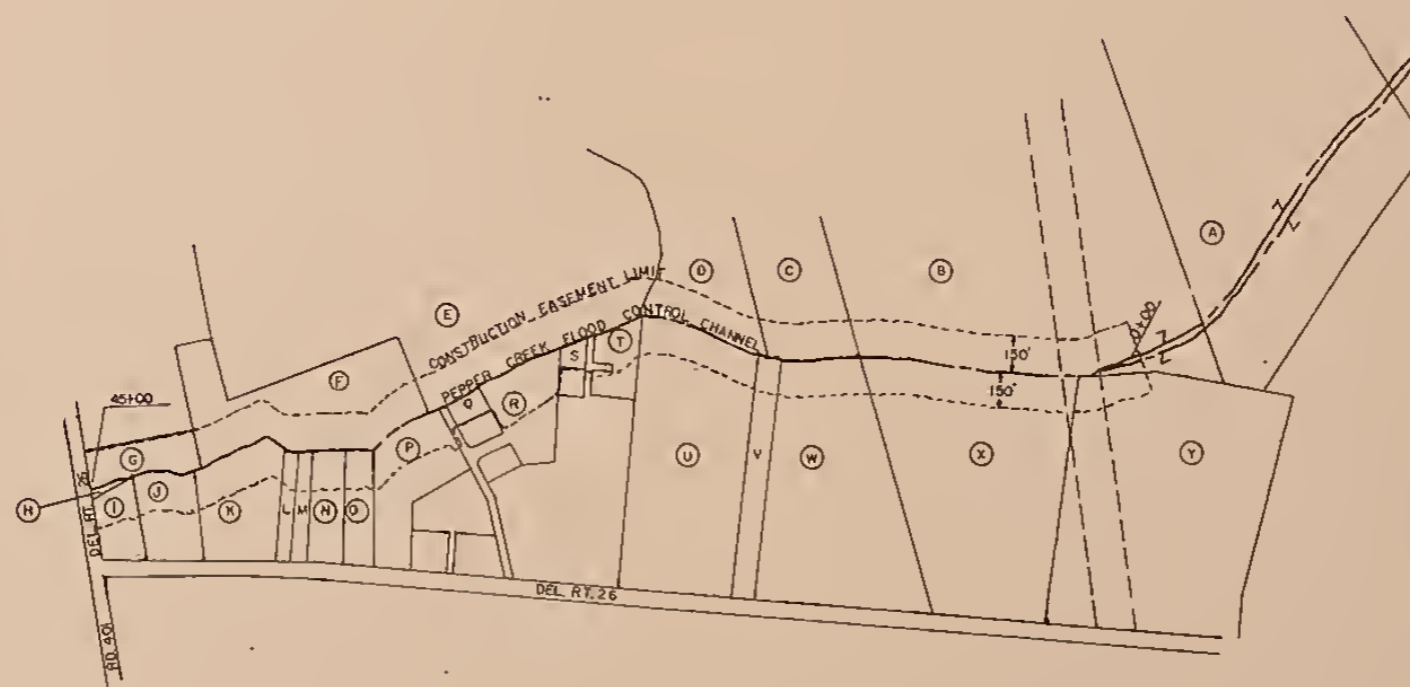


PEPPER CREEK TAX DITCH
SUSSEX COUNTY
DELAWARE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



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Traced by O. C. B. R. Wright		Sheet _____
Checked by Emerson, J. Bartholomew	2/77	Drawing No. _____

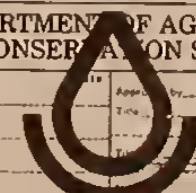


SCALE 1" = 400

PEPPER CREEK TAX DITCH
SUSSEX COUNTY
DELAWARE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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Traced by _____
Checked by _____



APPENDIX C

Discussion and disposition of each comment on the Draft Environmental Impact Statement -

Comments on the Draft EIS were received from the following:

- U.S. Department of the Army
- U.S. Department of Commerce
- U.S. Department of Energy
- U.S. Department of Health, Education and Welfare
- U.S. Department of the Interior
- U.S. Department of Transportation
- U.S. Environmental Protection Agency
- Office of Equal Opportunity - USDA
- Delaware River Basin Commission
- Delaware Division of Fish and Wildlife
- Sussex County Community Action Agency, Inc.

A response for each comment received is provided in this appendix. The page numbers refer to the Draft EIS. Comments have been numbered when multiple comments were received. The original letters of comment are included in Appendix D.

1. Comment:

The draft EIS does not adequately address the impact of the project on Pepper Creek down stream of the Route 26 bridge. While classified as a navigation channel this portion of the creek is extremely shallow. At present, deepening of the navigation channel has not received Section 404 approval. It is presumptuous to evaluate SCS Pepper Creek impacts based upon unofficial Corps plans. The proposed Corps of Engineer's channel widening and deepening as a navigation channel would destroy wetlands and stream bed habitat and is contrary to wetlands guidelines. Further, there is little public access to the stream so that marginal public use would be derived from the navigation project.

1. Response:

The project for the navigation channel was a state project, but it has been dropped in favor of replacing the bridge. It is expected that some selective clearing and snagging will be required in the downstream area to accommodate flood flows. The impacts are expected to be minimal as a result of this work.

2. Comment:

The draft EIS does not address the impact on Pepper Creek between Route 26 and Highway 113. According to a citizen from the area, during extremely heavy rains the water backs up at the bridge due to the size of the culvert under Route 26. The area below the bridge is usually not flooded.

2. Response:

The area between Route 26 and Highway 113 contains a 4500 foot-long area of Johnston Soils which are characteristic of Type 7 wetlands before drainage. No work is planned in that area unless the reconnaissance indicates a need for some selective snagging by hand labor.

The bridge which the state will install will remove hazards associated with the existing flooding conditions as well as any project-induced effects.

3. Comment:

According to President Carter's Executive Order 11988 pertaining to the floodplains, Federal policy is to avoid adverse impact on floodplains and to restore the natural and beneficial value served by floodplains. We would not, therefore, support the development of the area within the floodplain for residential use. However, we would not object to maintenance of some necessary ditching to support existing agricultural activities. The EIS should better define the minimum work necessary to accomplish this objective.

3. Response:

According to the President's own interpretation, the need for Executive Order 11988 is to address problems arising from unwise land use practices. The Pepper Creek watershed does not include floodplains in the traditional sense. Except for the area downstream of the Route 26 bridge, the floodplains outside the agricultural areas are too small to consider for any development. The stream "valley" is a narrow and moderately deep incision between the flat upland areas where agriculture has flourished for 250 years or more, and the Indian River embayment on the coast.

The flooding areas in this project area are in the uplands where agricultural crops are produced. Under existing conditions, flooding must occur before runoff can begin. The flat topography does not have enough gradient to cause runoff. The transition between the flat uplands and the coastal zone is rather abrupt and accounts for the deep and narrow channel in that area.

We know of no intent nor potential for development in the floodplain relative to the concerns of Executive Order 11988. The floodplains addressed by the project would be benefited by the project and the extent and frequency of flooding reduced up to the 5-year storm. Moreover, the proposed use of the flood areas for agricultural production is considered to be the best land use for the area.

4. Comment:

Wetland areas which may be impacted are only scantily described throughout the DEIS. In order to fully evaluate potential wetland impacts, detailed maps indicating stream, ditch and wetland areas should be included in the document. Descriptions of wetlands vegetation to be impacted should accompany the maps.

4. Response:

Page A-18 herein contains the best description of the existing wetlands which the biologists on the evaluation team could formulate. As noted in Comment 2, some soils typical of Type 7 wetlands occurs along the channel between Highway 113 and Route 26. This is downstream of the construction area. The combination of vegetative measures, control inlet pipes, reverse berms, and in-channel sediment traps is expected to minimize any project impacts on the area. The frequency, depth, and expanse of flooding may be reduced on the Type 7 wetland.

Some mixed Type 5 and Type 3 wetlands occur within the confines of the channel. It is expected that these will regenerate within about 2 years after the channel work has been completed.

1. Comment:

We have serious concerns about the approach this Environmental Impact Statement takes. Whereas, it is the objective of an EIS to be an aid to the decision making process, this statement seems to have been prepared to justify a decision already made i.e., to channelize Pepper Creek. The purpose of the EIS should be to clarify issues and to forecast and analyze significant impacts. This in our opinion, has not occurred in this document. The EIS attempts to justify channelization on Pepper Creek but does not adequately describe existing fish and wildlife conditions nor does it adequately discuss the project's impacts on those fish and wildlife resources.

1. Response:

This EIS was prepared in accordance with the SCS procedures for compliance with NEPA (7CFR650), and is a part of the decision-making process. Decisions made heretofore by the sponsors have resulted in their adoption of the selected plan as the best manner in which to achieve their objectives in the most environmentally and economically advantageous manner. The descriptions of existing fish and wildlife resources and the project's impacts on these resources were prepared by the biologists who comprised the assessment team; the results were reviewed and concurred on by a staff member of US F&WS.

2. Comment:

The EIS fails to point out the exact locations slated for channelization. It, also, fails to mention the location of associated wetlands that may be adversely impacted by project implementation. Cedar Swamp, the remains of what was once an extensive wetland near the project area, is not even mentioned. Further, there is no evidence that the President's Executive Orders on Floodplain and Wetland Management or the President's Water Policy Directives were considered in the drafting of this EIS.

2. Response:

The project map is being revised to show the reaches for the planned channel work. The only wetlands in the project area are described in the narrative of both the measure plan and EIS. Cedar Swamp is outside the project area and thus was not included in the evaluation.

See the response to EPA's comments relative to Floodplain and Wetland Management.

3. Comment:

According to the EIS the purpose of the project is to reduce flooding and provide drainage. Yet the statement indicates that the measure will "induce flooding along Route 26." The selected alternative defeats the purpose of the project. Further, a separate Delaware Department of Natural Resources project which has not been approved, a navigation channel from Route 26 to Holland Point, is needed to alleviate this downstream flooding.

3. Response:

See response to Delaware Division of Fish and Wildlife Comment 1.

4. Comment:

Page 3, first paragraph - It should be noted that the best buffer strip along stream banks is a combination of grass, shrubs and trees. The existing vegetation along stream channels is much more efficient than a 10-foot grass buffer. An SCS and Forest Service publication, "Woodlands of the Northeast" on erosion and sediment control guides recommends "leaving essentially undisturbed buffer strips between disturbed areas (i.e., cropland) and water courses." On a 0% slope they recommend a 25-foot filter strip for common logging areas. The width increases with the slope. The proposed project seems contradictory to these recommendations.

4. Response:

The character of "common logging areas" and adequately drained agricultural cropland cannot be compared in this regard. Although both cause soil perturbation, logging activities occur year around and compact the soil and decrease the soil permeability. Where adequate drainage has been provided as proposed in the selected plan, the soil permeability is increased and the potential for erosion reduced.

5. Comment:

Page 3, first paragraph - It should also be noted that a grass strip (SCS commonly uses a lespedeza, fescue or rye grass) has far less value to a variety of wildlife than does natural streamside vegetation (i.e., red maple, spice bush, poison ivy, dogwood, jewelweed, greenbriar, blackgum, honeysuckle, etc.).

5. Response:

SCS in Delaware uses a plant mixture agreed to by biologists from SCS, the state, and the U.S. Fish and Wildlife Service. The intent of the mixture is to provide protection until a stand of natural plants is established.

6. Comment:

Page 3, third paragraph - The statement is made that complete removal of hedgerows will reduce rabbit and quail habitat 5%. We question this figure based on other SCS reports. The estimate on the Marshyhope River Watershed was a 9.4% loss in quality of open land wildlife habitat, 6-12% in the Upper Chester River Watershed, and 10.3% on the Upper Choptank River Watershed. The discrepancy should be clarified.

6. Response:

The reduction is based upon the evaluation of existing conditions in an area where a proportionally small amount of hedgerows exist when compared to the other projects. See pp. A-10.

7. Comment:

Page 3, third paragraph - A discussion as to how retention or replacement of hedgerows will increase habitat quality by 3.5% should be included.

7. Response:

The discussion is included on pp A-11 and A-12.

8. Comment:

Page 3&4 - It is stated that after project implementation marginal lands subject to flooding and drainage problems will become suitable for homesites. This is interpreted to mean that drainage of wetlands within the floodplain will be drained for the purpose of changing land use. This is contrary to both SCS Conservation Planning Memo 15 and the President's Executive Order on Floodplain Management.

8. Response:

The narrative on pages 21-22 should clarify this unique interpretation. The marginal land referred to is that which is currently economically marginal, but needed at present to sustain the farming operation. Once adequate drainage has been provided to the productive lands which now flood, the economically marginal areas will not be farmed any more and are expected to revert to other uses such as homesites, forest land, idle land or pasture land.

9. Comment:

Page 4, third paragraph - Should drainage be required of forest land adjacent to the channels, it could very well involve a wooded swamp, a viable part of the floodplain. These areas should be resurveyed for possible wetland types.

9. Response:

The environmental assessments have shown that no wooded swamps (Type 7 Wetlands) exist in the project area where channel work will be performed. The area between Highway 113 and Route 26 is a Type 7 Wetland, but no work will be performed in that area.

10. Comment:

Page 5, first paragraph - Alternative plans to the selected plan have not been adequately addressed. With the President's Executive Order on Floodplain Management in effect, the integrity of the floodplain through woodland should be protected.

10. Response:

The alternatives considered reasonable have been adequately addressed and discussion is provided on pages 17-19.

We see no inconsistencies between the proposed plan and Executive Order 11988. According to the President's interpretation, the need for the executive order stems from unwise land use decisions. The planned land use in the project area, including the forest land, is considered the best land use for both human and environmental interests.

11. Comment:

Page 5, second paragraph - Land treatment measures must be defined. Field ditches and lateral ditches proposed as the only land treatment measures are not in keeping with the intent of the President's Memorandum concerning the Improvement in Soil Conservation Service Programs. Here the need for reducing adverse environment impacts and improving the soil conservation functions of SCS were addressed. The Memorandum states "In planning watershed projects, SCS officials shall seek further acceleration of land treatment measures." Cost sharing funds are to be used for those measures which directly contribute to control of soil erosion and water pollution. Land conservation practices and areas requiring land conservation treatment should be identified. Requirements for periodic post-project monitoring to ensure implementation and Operation and Maintenance must be established.

11. Response:

The land treatment measures will not be cost-shared as part of this project. The land treatment measures, by and large, will consist of field ditches and lateral ditches which will address the specific concerns of the President's Memorandum. See Response 4 to Delaware Division of Fish and Wildlife.

12. Comment:

Page 11 - Fishery Resources. The "beneficial effect on the fishery resources" and the existing fishery resource should be fully described. The principles developed for use in the Sacony Creek Watershed in Pennsylvania should be described. This section does not adequately describe the resources involved.

12. Response:

The narrative on page 11 is being amended to cite Evaluation of the Effects of Channelization on Small Coastal Plain Streams of Maryland, by Speir, Harley; Weinrich, D.R., and Carter II, W.R.; Fisheries Adm. MDNR, July 1976.; and An Assessment of Economic and Environmental Effects of Completed PL-566 Channel Modification Projects in Worcester and Wicomico Counties, Maryland, by Ecol Sciences, Inc., 133 Park Street N.E., Vienna, VA 22180, August 1976.

The section to which you refer is a summary of expected effects of project action on the resource under discussion. More complete description is contained in Appendix A.

13. Comment:

Page 11 - Wetlands. The wetland areas must be identified. How will acres of Type 5 Wetlands be increased from 17 acres to 22 acres after project implementation? How will impacts be avoided on wetlands as a result of project action? The remains of Cypress Swamp and Burnt Swamp are in the vicinity of the project area. What will be the impact on these two wetlands? This section does not adequately address wetland resources.

13. Response:

The wetland areas have been identified in accordance with U.S. Fish and Wildlife Service Circular 39 criteria. The gain in Type 5 Wetlands occurs as a result of sediment traps and changes in flow type in the channels. There are no expected adverse impacts on wetlands; moreover, there are no wetlands within the project area which are expected to be impacted except as described in the narrative.

Cypress Swamp and Burnt Swamp are the same resource and lie to the south of the project area. Wetland resources are described in Appendix A, not in the summary of impacts to which you refer.

14. Comment:

Page 12 - Man-Altered Perennial Streams. How and where perennial streams will be increased from 8.6 to 17.0 miles should be explained.

14. Response:

Perennial streams will occur where the channel is deepened and intercepts groundwater and where the drainage areas exceed about 500 acres.

15. Comment:

Page 12 - Man-Altered Intermittent Streams. How and where ephemeral streams will be increased from 10.3 to 16.0 miles should also be clarified.

15. Response:

Ephemeral streams will occur where the channels are deepened and intercept groundwater and the drainage areas are generally less than 500 acres.

16. Comment:

Page 16 - Adverse Impacts Which Cannot Be Avoided. Reduction in wildlife habitat through hedgerow removal is not listed as an unavoidable adverse impact. It is evident in the EIS that there is little intention of replacing hedgerows even though this could readily be accomplished. Reduction in wildlife habitat should, therefore, be added to this list as an adverse impact which will not be avoided.

16. Response:

This is not considered an unavoidable adverse impact. Any impact resulting is expected to be of short duration and of minimal impact. Your assumption of no intent of hedgerow replacement is unwarranted. Delaware Laws, Title 7, Chapter 41, require maintenance rights-of-way, which are periodically mowed. Seasonal maintenance can be utilized to provide not only hedgerows but an improved habitat. Discriminate pruning of existing tall, woody structures will permit more integrity in one-sided construction and also leave an acceptable hedgerow.

17. Comment:

Page 18 - Land Treatment. What are the components of the conservation plan discussed in this paragraph?

17. Response:

The components of the conservation plan are those measures required to meet the conservation need on an individual farm for the planned farming operation. Each plan is developed with the landowner to address his resource problems.

18. Comment:

Page 18 - "No Project - Future Without Action." How wildlife habitat will decrease by 0.1 percent with no action and which species of wildlife this refers to should be addressed.

18. Response: See pages A-10 to A-14 in Appendix A.

19. Comment:

Page 19 - The statement is made that without the project annual benefits of \$48,900 will be foregone. Therefore, to provide a complete analysis the costs that will be foregone must also be addressed.

19. Response:

The benefits foregone consist of the difference between Total Beneficial Effects and Total Adverse Effects. See page 18 of the measure plan.

20. Comment:

Page A-1 - It would appear that most of the material found in Appendix A should be incorporated into the main section of the document since this material is the substance of the report.

20. Response:

The Environmental Impact of the Proposed Action on pages 8-15 consists of summaries of the sections in Appendix A.

21. Comment:

Page A-1 - Erosion and Sedimentation. This section identifies erosion and resulting downstream depositions of sediment as the cause of reduced channel capacity. It further suggests that channel construction is a significant contributor of the sediment deposits. From this section another and better alternative to the proposed action should have been developed.

21. Response:

The review of this EIS was not fruitful in eliciting reasonable alternatives to the proposed action. The narrative describes events which have transpired during the past 250 years. The response to Comment 4 of the Delaware Division of Fish and Wildlife indicates a considerable sediment potential from erosion of flat, inadequately drained cropland. The project is designed to provide drainage and flood prevention on the cropland, and erosion and sedimentation rates will also be reduced.

22. Comment:

Page A-2 - This page implies that ditching is needed to reduce sediment input into the waterway. Page 13 of the document, however, states that after construction and after the banks have revegetated, turbidity levels and suspended sediment concentrations will "recede to levels somewhat below preproject levels..." This statement suggests that the project will do little or nothing for sediment concentrations, turbidity, or water quality in general. There are no solid supporting facts for reduced sediment concentrations after project implementation. No discussion occurs about the impacts of increased velocities and resulting instream bank scouring which will occur after project implementation during periods of high flow. This should be addressed.

22. Response:

See response to Comment 4, Delaware Division of Fish and Wildlife. It is our opinion that a reduction of sediment estimated at over 3,000 tons per year is a substantial benefit to water quality. Studies have not been performed to determine levels of sediment concentrations after construction. However, other studies show no significant change in levels of sediment concentrations in other similar projects, and deleterious effects of increased levels are not evident in the studies by Speir and Ecol. Sciences, Inc., on fish populations. The absence of significant adverse effects is supportive of the planned work.

The effects of any increase in velocities and of any in-channel scouring will be addressed in the design phase. In-channel sediment traps will be constructed and maintained as noted in the measure plan.

23. Comment:

Page A-3 - The first two paragraphs imply that ditching the Pepper Creek drainage system is the only way to reduce erosion/sedimentation. Page A-1 states that the effects of channel construction "can be assessed quite accurately as depositions of upstream silt and sediment have formed an alluvial border on the inside of old channel banks and reduced the channel width from 75 to 15 feet." This evidence "supporting" channelization, clearly supports the need for the development of other alternatives.

23. Response:

The narrative cited depicts existing conditions and shows effects of both efficient and inefficient channels. There is no record to show the type or character of channel construction which has occurred since agricultural operations began some 250 years ago. The age of the old banks has not been determined, nor has the age of the sediment which has

diminished the capacity within the old banks. Recorded history in Delaware does, however, show that adequate drainage has been lacking in the watersheds of the coastal streams from the time of settlement. Evaluations of cultural resources are also supportive of the need for drainage by their location alone.

These indicate that the processes of erosion and sediment deposition did not start with the onset of channel construction which is necessary to support an agrarian economy.

While past records are not available to define existing conditions, there is ample evidence to support the benefits stated in regard to sediment reduction. The selected plan was chosen as the most reasonable alternative in terms of environmental and economic effects.

24. Comment:

Page A-3 - The last paragraph states that the "project will significantly reduce the amount of erosion and downstream deposits of silt and sedimentation that will occur if the project is not done." Again, on page 13, it states that the project is not expected to have a significant effect on water quality. The contradiction should be clarified.

24. Response:

The principal effect on water quality which can be related directly to project action is the reduction of sediment produced by the erosion of nearly flat cropland during periods of flooding. The volume from the 3,100 acres of cropland is estimated at 6,100 tons per year. The statement on page 13 refers to baseline water quality parameters where we do not expect a significant change.

25. Comment:

Page A-11 - What constitutes a "high value herbaceous cover" should be discussed.

25. Response:

The "high value herbaceous cover" is the cover which results from establishment of vegetation produced by the seeding mixture recommended by SCS, state, and U.S. Fish and Wildlife Service biologists.

26. Comment:

Pages A-10 & A-12 - Openland Wildlife and Woodland Wildlife. Which openland and woodland species does the statement refer to?

26. Response:

The principal species of openland wildlife are rabbits and bobwhite quail. The principal woodland species are deer, squirrel, and woodcock. The species and procedures used for evaluation are defined in more detail in Appendix C of the Delmarva River Basin Cooperative Survey by the U.S. Department of Agriculture, October 1978.

27. Comment:

Page A-16 thru A-23 - Stream Fish Habitat. This section attempts to support channelization on the basis of increasing species diversity. Actually, a unique aquatic habitat which only occurs in areas with little or no relief, heavy organic material input, low ph, and low dissolved oxygen supports aquatic species that are dependent on those very parameters. To alter a stream to a temporary fast moving water condition which would not naturally occur due to the relief (much of this area was part of an extensive swamp prior to 1954) is not necessarily a best fishery management practice.

27. Response:

The section cited only describes existing conditions. Your conclusion that it is supportive of channel work is consistent with that of the assessment team.

We know of no areas where temporary fast moving water will occur as a result of the planned work. We do not contend that the planned channel work is a best fishery management practice; fishery management is not an objective of the project inasmuch as the species present in the sampling are of such size (average weight is 0.00762 pounds) that fishery management would be of dubious value. Other evaluations indicate that environmental values are enhanced by drainage in that the populations and diversity are increased.

This area is typical of Delaware coastal streams which drain nearly flat uplands and is unique in no significant sense.

28. Comment:

Page A-30 - Water Quality. The second two paragraphs are unclear.

28. Response:

These paragraphs indicate that we have no reason to believe that the water quantity will not be changed from that recorded by the gage operated by USGS at Dagsboro between 1962 and 1975.

29. Comment:

Page A-30 - The statement is made that total flow volume could decrease through increased evapotranspiration by crops. It should be noted that the existing trees along the channels have evapotranspiration rates tremendously exceeding that of crops and their removal will in fact be responsible for increasing the flow. Therefore, if decreasing total flow volume is the goal, then the trees should be protected.

29. Response:

Decreasing flow volume is not a goal of the project.

30. Comment:

Page A-33 - The statement is made that turbidity levels are expected to increase slightly during construction. This statement is not supported by other channelization projects on the Eastern Shore. The EIS for the Upper Choptank River Watershed for example states that construction elevates turbidity levels even after the establishment period. Turbidity levels were nearly twice as high on sites with PL-566 construction as on those sites without. The statement that "Pepper Creek flood and drainage project will reduce both the short-term and long-term turbidity levels in the channels of the system" should either be supported with data or changed to reflect past evidence.

30. Response:

Turbidity is caused by suspension of colloidal material and organic material as well as by sediment. A complex of factors not fully understood introduces variability into the results of turbidity measurements. Better comparisons can be made in evaluating sediment concentrations by looking at suspended solids. Although the suspended sediment levels paralleled the turbidity levels in the Choptank study, all were well within the EPA's recommended standard.

Turbidity levels reported in the Choptank study showed an 18 percent increase after the establishment period. No differentiation was made as to the source of increased turbidity. However, the suspended solids level decreased 18 percent, but the character of the material which caused the reduction was not identified.

This EIS does not purport any expectation of a significant change in baseline water quality parameters as a result of the channel work. The most significant effect is expected to be a reduction of the sediment load during periods of flooding of cropland.

The narrative cited is a statement of opinion by the assessment team and reflects his professional opinion based on the data evaluated as well as on his personal experience. The summary on page 13 states that the project is not expected to have significant effect on water quality.

31. Comment:

As we noted the description of project impacts on fish and wildlife resources is inadequate. An equal deficiency is the lack of attention and commitment to measures which could mitigate the obvious negative impacts on these resources. A revised draft or final environmental statement should address both of these concerns in depth.

31. Response:

The assessment team on which a member of your staff participated did consider the reports to be adequate, and concurred verbally in a finding of no significant impact and that the recommendation should be a negative declaration. We are unable to perceive the negative impacts over which you express concern. The specific questions which your comments raise have been addressed in the responses. Where explicit concerns have not been expressed, and where, in fact, detailed studies show the absence of significant resources or adverse impacts on the resources present, we find it difficult to formulate a response.

32. Comment:

SUMMARY

The EIS appears to be in direct conflict to the President's Executive Orders concerning floodplain and wetland management. This document does not adequately describe the existing fish and wildlife resources or the impacts on those resources of the project area. It contains erroneous information and does not adequately identify channelization activity. These items should be fully addressed.

Further, the project and its induced flooding is dependent for relief on a navigation project that has not been and, quite probably will not be, approved for construction. There is no discussion of alternative plans should the navigation channel not be implemented. Also, there is no mention of permits that will be required prior to construction. This should be discussed. Should Corps of Engineers permits be required, the Fish and Wildlife Service will probably object to the project as it is presently described.

32. Response:

We have addressed specific concerns which this comment summarizes.

33. Comment:

We hope the above comments will be evaluated on the basis with which they were made. That is, to help improve the statement to the point that it will fulfill the intent of NEPS and can be used effectively in the decision making process on this project. Because of the inadequacy of the draft statement, we believe that a revised draft is necessary to provide sufficient basis for review.

33. Response:

We appreciate all comments which are intended to help improve the statement and its value in the decision-making process.

It is our opinion that the document fulfills both the letter and intent of NEPA, and also describes the existing resources and the expected impacts of the project on those resources.

34. Comment:

We are particularly concerned that this project was developed with a complete disregard for the Channel Modification Guidelines. Our records show that the requirements of the first four steps - Preapplication, Application, Planning and Detailed Planning - of the Guidelines' Coordination of Field Level Planning have not been complied with except in the most superficial fashion. Considering the level of commitment which both our Departments have made to the full implementation of the Guidelines, the present situation is a serious failure in required coordination. Since the first level of coordination (SCS State Conservationist/FWS Area Manager) has not been successful in problem resolution, it is our intention to elevate this proposal to the next level (SCS Administrator/FWS Director) of review and coordination. It is our recommendation and request that no further action be taken in regard to this proposal until that required coordination has been accomplished.

34. Response:

Pages 25 and 26 document the chronology of development of the plan for this project. The Department of the Interior was involved in development of the plan and EIS under the then existing procedures for inter-agency coordination in plans of this type. The measure plan and EIS were completed during 1976-77. Local priorities and availability of funds for project implementation indicated that the measure should be shelved temporarily. It is our opinion that no significant change would result in the measure plan and EIS had the planning been done under the channel modification guidelines. The channel modification guidelines were adopted in February 1978.

Your comments are a part of the review process in which we are now engaged.

1. Comment:

We have reviewed the Draft Environmental Impact Statement (EIS) for Pepper Creek, Flood Prevention and Drainage RC&D Measure, Sussex County, Delaware. We are responding on behalf of the Public Health Service.

The principal effects of this action--temporary degradation of water quality during construction and peak discharge rates to increase downstream in the Dagsboro area--need to be more thoroughly addressed regarding specific adverse effects and possible mitigation efforts. We are concerned with the possibility of water degradation during construction, particularly by contamination from petroleum products. Appropriate monitoring efforts should be instituted during the construction period to safeguard against this possibility.

1. Response:

Temporary degradation of water quality is expected to occur as a result of disturbance of the wet soils during construction. The use of excavating machinery in the watershed during the construction period is not expected to pose an unusual hazard to petroleum contamination. The contractor is obliged to guard against spillage of petroleum products both from economics and as a part of the contract requirements. Daily inspection of the construction is used to monitor the contractor's performance.

2. Comment:

Although an improvement in channel efficiency is a specific project purpose, the effects of out of bank flow downstream during "certain" storm events should be further explained (p.9). The expected frequency of these storm events should be noted.

2. Response:

Out-of-bank flow is expected to occur when runoff exceeds the designed channel capacity. The design storm frequency is that storm which would be expected at a 20 percent (5-year) chance of occurrence in a given year. With the project installed and with the occurrence of a runoff event in excess of the design storm, out-of-bank flow will be expected to occur in areas which presently flood one or more times annually. The project is expected to increase peak discharges about 18 percent during the storm having a one percent (100-year) chance of occurrence in a given year. The highway will flood under present

conditions to a depth of 2.5 feet. A Texaco station about 75 feet downstream will flood to a depth of 1.6 feet; a house 50 feet upstream will flood to a depth of 2.6 feet; a house 350 feet upstream will flood to a depth of 1.9 feet.

The bridge is to be replaced by the state and the existing flooding hazard will be removed.

3. Comment:

No significant vectorborne disease impacts are expected from this development. Drainage improvement projects of this type generally benefit vector mosquito control by minimizing or eliminating some breeding habitats.

3. Response:

None required.

Comments of: USDA - Office of Equal Opportunity (September 18, 1979)

1. Comment:

SCS Guidelines for Compliance with NEPA 7 CFR 650.8(b)(3), require Environmental Impact Statements to describe the impacts of proposed actions on "...demographic and social effects, including civil rights impacts on minority groups and low-income persons." The Draft Statement for the Pepper Creek RC&D Measure does not identify and describe effects on minority populations. The Final Statement should indicate that this has been done and that no adverse effects on minority persons will result from the proposed actions.

1. Response:

Please refer to the comment of the Sussex County Community Action Agency, Inc. We have revised the narrative to reflect the expected positive benefits and have included a copy of the Executive Director's letter in Appendix A.

Comments of: Sussex County Community Action Agency, Inc. (October 9, 1977)

1. Comment:

Please be advised that we have reviewed the plans for excavations of Pepper Creek and its connecting drainage ditches and find no adverse effects resultant from these actions. In point of fact, we believe the surrounding low-income and minority communities served by these drainage routes will receive a direct benefit as a result. Standing water in yards, driveways and even some intersections of the area has long been a problem. The growth potential for these communities and similar ones we think will be enhanced. We therefore recommend this project highly.

1. Response:

We appreciate your comment supportive of this project.

Comments of: Department of Transportation - Region III (September 27, 1979)

1. Comment:

We have reviewed the subject draft EIS and have no significant comments to offer. The project details should continue to be coordinated with the Delaware Department of Transportation.

We appreciate the opportunity to review and comment on the document.

1. Response:

We appreciate your taking time to review the draft project plan. Coordination with the Delaware Department of Highways will be continued.

Comments of: U.S. Department of Commerce, Assistant Secretary for Science and Technology (October 5, 1979)

1. Comment:

The text contains apparent contradiction which should be explained. The environmental statement refers to the flat topography which has

governed project design (page 5, line 3; page 14, line 10), yet there are well-drained hills near the project (page 6, line 8; page 12, line 18). The project map, Appendix B, does not show any of this topography even though the text states that "...the construction rights-of-way (may) come within 100 feet of the soil boundaries delineating those well-drained hills indicated on the accompanying maps." (page 6, lines 24-26, emphasis added).

1. Response:

These well-drained hills near the project are in the transition zone between the flat coastal zone and the flat uplands where the project is to be installed.

2. Comment:

Appendix A, pages A-1 to A-37 -- The Appendix is poorly organized, and difficult to follow. Tables 1 to 7 are not in numerical order; and Table 8, page A-34 is not numbered, Page A-17 is missing; the place between pages A-16 and A-18 is occupied by a duplicate page A-19.

2. Response:

We regret any confusion which the organization of this material may have caused. Appendix A consists of reports prepared by members of the interdisciplinary team which evaluated the project. The tables in question were in an Appendix to the biologists report. The order in which the data was presented in the original report did not coincide with the order in which the environmental concerns were posed. Thus, a rearrangement of the biologist's report resulted. Printing and collation errors caused omission of A-17 and the missing page number on A-34.

3. Comment:

Appendix A, page A-11, line 14 - The reference to mean distances should be Table 7, not Table 1.

3. Response:

We regret this typographical error and have made the correction.

4. Comment:

Appendix A, page A-33, footnote 3 - Footnote 3/, given as the reference for allowable levels of total coliform for secondary contact recreation (pages A-32 and A-33, paragraph G, last 3 lines) presents instead the standard for fecal coliform.

4. Response:

This footnote was intended to define secondary contact recreation. The reference to fecal coliforms has been deleted. No level for total coliforms has been published for Delaware, although the generally accepted level is 750 colonies/ml.

5. Comment:

Appendix B, page B-1, Project Map - The map needs considerable improvement. It was impossible to follow the project description or the location of flood and drainage areas on this map. Sampling stations 21, 22, 23, and 24 (Tables 1, 4, and 5) are not shown, nor are the topographic features mentioned in the General Comment, above.

5. Response:

The project map shows the planned channel work as it is shown on the tax ditch organization map. The sampling stations have been added to the map. The topographic features referred to in the archaeology report are not in the project area. The scale of the revised map is 1" to 660 feet reduced to half size.

Comments of: U.S. Department of Commerce - National Oceanic and Atmospheric Administration (September 21, 1979)

1. Comment:

The purpose of the project is flood reduction, yet there is no climatic information relating to flooding. The DEIS would be enhanced by a discussion of the type, duration, and frequency of meteorological events which result in damaging floods. Climatological information which may be useful is available from the National Climatic Center, Asheville, North Carolina 28801.

1. Response:

We appreciate your comment and the informational note. The small size of this project would indicate little variability in climatic effects. The nature of soils in the project area is such that some flooding of cropland normally results several times a year. Since the damage is to agricultural crops and the associated operations for their production, the significance of a discussion of meteorological events is diminished.

Comments of: Department of the Army, Office of the Assistant Secretary
(October 11, 1979)

1. Comment:

Measures described in the plan would not conflict with any existing or proposed flood control programs of the U.S. Army Corps of Engineers.

1. Response:

None required.

2. Comment:

The EIS should discuss the need for a Department of Army permit as required under Section 404 of the Clean Water Act (33 USC 1344). Local sponsors should be advised to coordinate with the Philadelphia District Engineer for this permit. Pre-application consultation should be arranged with Mr. T. F. Schina, Chief, Permits Branch; U.S. Army Engineer District, Philadelphia; U.S. Custom House; 2nd & Chestnut Streets; Philadelphia, PA 19106 (215-597-2812).

2. Response:

We have amended Section III to include the need for compliance with local, state, and federal laws, rules, and regulations, which is the sponsor's responsibility. We have enjoyed excellent working relations with the Permits Branch on similar projects.

Comments of: U.S. Department of Energy (October 24, 1979)

1. Comment:

This is in response to your request to review and comment on the draft Resource Conservation and Development (RC&D) measure plan and draft environmental impact statement for the Pepper Creek Flood Prevention and Drainage RC&D measure in Sussex County, Delaware. We have examined both documents and have no comments to offer.

1. Response:

We appreciate your taking time to participate in the review of the measure plan and EIS.

Comments of: Delaware Department of Natural Resources and Environmental
Control - Division of Fish and Wildlife

1. Comment:

Page 5. The proposed navigation channel downstream of Route 26 has not been approved yet by the appropriate federal and state review agencies. To count on this dredging to eliminate the project - induced flooding along Route 26 would be premature at this time. What would be the effect on the downstream area if the navigation channel were not approved?

1. Response:

Flooding occurs along Route 26 under existing conditions during occurrence of the 100-year storm event. The project would increase peak discharge rates about 18 percent at Route 26 and increase depth of flooding from elevation 15.3 to 15.9; three buildings would continue to be flooded during the 100-year storm event. A Texaco station located downstream of Route 26 is at elevation 13.6; flooding now reaches elevation 14.2; a house 50 feet upstream of Route 26 at elevation 12.9 is flooded to elevation 15.5; a second house 350 feet upstream of Route 26 is at elevation 13.8 and is flooded to elevation 15.7. The depth of flooding at each property would be increased by about 0.6 feet if the navigation channel is not installed.

The navigation channel proposed by the Division of Soil and Water Conservation would eliminate flooding of Route 26 whether or not the project is installed, and would also eliminate flooding of the Texaco station. The houses upstream are to be protected by diking to eliminate first-floor damages.

Since the navigation channel was already planned and applications filed, it appeared the most reasonable approach to take advantage of any effects which would result from implementation of that proposal. If the navigation channel is not constructed, the sponsor will select from available alternatives and other measures to remove any induced effects. These could include relocation, acquisition of property, bridge enlargement, diking, raising of the structures, flood proofing and similar measures.

2. Comment:

Pages 5 & 10. There are apparently conflicting statements on these two pages in regard to the anticipated conversion of farmland to residential or other uses. Would this project result in more or less conversion of previously marginal farmland to other uses?

2. Response:

We expect that some changes in land use will occur, but foresee no significant change as a result of the planned action.

3. Comment:

This would be an excellent opportunity to set up a monitoring program to show if levels of N and P actually decrease or remain the same in constructed channels as asserted or increase. Perhaps a monitoring program with the cooperation of the state or the Sussex 208 Program would be appropriate. This avenue should be investigated so that the results could be applied to other proposed drainage projects in Delaware.

3. Response:

We appreciate this comment. We are currently considering plans for such a monitoring program in another project.

4. Comment:

A-3 - Statements like "The Pepper Creek Project will significantly reduce the amount of erosion and downstream deposits of silt and sedimentation" should be documented. We would like to see a modest project set up to assess the volume of sedimentation and nutrient releases resulting from this project.

4. Response:

"The Universal Soil Loss Equation can be used to estimate the reduction in soil erosion in the Pepper Creek Project. The Universal Soil Loss Equation (USLE) is written $A = RKLSCP$ where A is the predicted soil loss, R is the rainfall factor, K is the soil erodibility factor, LS is the slope length and slope steepness factor, C is the cropping and management factor and P is the conservation practice factor.

Drainage will permit a change in the C factor by allowing a change in the crop rotation and tillage methods. The following is an example of how results are obtained by holding all USLE factors constant except the C factor for Pocomoke and Fallsington soils.

Present Condition

R = 225	
K = .28	A = 225 x .28 x .16 x .378 x 1
LS = .16	
C = .324	= 3.8 tons/acre/year
P = 1	

The C factor is based on continuous soybeans, one-year rotation with conventional tillage methods; crop residues are left on the soil surface and no winter cover crop is used. This is the condition before drainage.

Removal of excess water from the soil profile will change permeability from "slow" to at least "moderate" and will change the "K" factor from 0.28 to 0.22. Adequate drainage also permits management to change the conservation cropping system and modify the "C" factor.

With Project

$$\begin{array}{ll} R = 225 & \\ K = 0.22 & A = 225 \times 0.22 \times 0.16 \times 0.147 \times 1 \\ LS = .16 & \\ C = .147 & = 1.2 \text{ tons/acre/year} \\ P = 1 & \end{array}$$

The C factor is based on after drainage conditions and will permit a two-year rotation of corn and grain double cropped with soybeans; the tillage system includes chiseling and shallow disking for the corn and grain with the soybeans seeded with no-tillage; residues are left on the surface and a winter cover crop that reaches the stemming stage is used."

The estimated soil loss is 2.6 tons/acre/year less for soils where adequate drainage prevails.

The 1976 Proceedings of the Third Federal Inter-Agency Sedimentation Conference includes "Sediment Yields from a Mississippi Delta Watershed" by C.E. Murphree, et. al, from the USDA Sedimentation Laboratory, Oxford, MS. The report describes erosion and sediment research related to continuous cotton on flat cropland. Their results show a sediment delivery ratio of 0.97. For this watershed, sediment delivery under existing conditions would amount to 4,420 tons/year from the 1,200 acres of wet soils. Attainment of 80 percent of the goal in management practices could result in reduction of sediment delivery of 3,000 tons/year from the wet soils.

Adequate drainage also permits use of Best Management Practices such as no-till farming and cover crops on all the cropland and 3,100 acres would be involved in sediment reduction.

5. Comment:

A-16 - There does not seem to be a map of the fishery sampling stations enclosed. This oversight should be corrected on subsequent editions.

5. Response:

The narrative has been changed on page A-13 to show the fishery sampling locations.

6. Comment:

Someone not familiar with the methods developed for the Sacony Creek Watershed (such as myself) would have a little trouble evaluating the results presented in the stream fish habitat section. Consequently, I have no comments about these data other than to point out that on Pg. A-20 it is risky to say that stream channel work does not adversely affect diversity of the macroinvertebrate community based on only one sampling station in a recently channelized area.

6. Response:

The Sacony Creek procedures developed by Carl Thomas were incorporated into the SCS Environmental Assessment Procedures and copies are available from SCS. The narrative on page A-20 has been expanded to cite the studies in other watersheds where similar results were obtained.

7. Comment:

In general we recommend that every effort be made to preserve as many hedgerows as possible and to modify only one channel bank wherever physically possible, particularly in existing wooded stretches. Maintenance of buffer strips and timely replanting of hedgerows should do much to minimize adverse impacts on associated biota. Every effort should be made to preserve existing wetlands in the project area.

7. Response:

This work will be performed in accordance with the guidelines for channel work in Delaware agreed to between SCS and Delaware Department of Natural Resources and Environmental Control staffs. We do not anticipate significant adverse effects on existing wetlands.

APPENDIX D

Letters of comment received from reviewing agencies



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
One Gateway Center, Suite 700
NEWTON CORNER, MASSACHUSETTS 02158

JUN 1 1979

Mr. Otis D. Fincher
State Conservationist
U. S. Soil Conservation Service
204 Treadway Towers
9 E. Lookerman Street
Dover, Delaware 19901

Dear Mr. Fincher:

Re: Pepper Creek Tax Ditch, P. L. 566

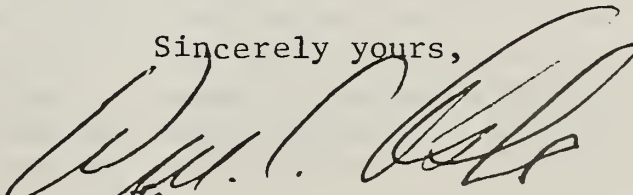
This responds to your April 12, 1979, request for information on the presence of Federally listed or proposed endangered or threatened species within the impact area of Pepper Creek Tax Ditch drainage.

Bald eagles (Haliaeetus leucocephalus) and peregrine falcons (Falco peregrinus) on occasion may pass through the area. However, based on present information, we believe the proposed project is unlikely to affect these or any other listed or proposed species under our jurisdiction. Therefore, no Biological Assessment or further Section 7 consultation is required with the Fish and Wildlife Service (FWS). Should project plans change or if additional information on listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to endangered species under our jurisdiction. It does not address any other FWS concern.

Thank you for your interest in endangered species. Please contact us if we can be of further assistance.

Sincerely yours,


ACTING
Regional Director



United States Department of the Interior

OFFICE OF THE SECRETARY

Northeast Region

15 State Street

Boston, Massachusetts 02109

ER79/835

October 19, 1979

Mr. Otis D. Fincher
State Conservationist
U.S.D.A., Soil Conservation Service
204 Treadway Towers, 9 E. Loockerman St.
Dover, DE 19901

Dear Mr. Fincher:

This is in response to your request for the Department of the Interior's comments on the draft environmental impact statement for the RC & D Measure Plan for Pepper Creek Flood Prevention and Drainage, Sussex County, Delaware. These comments are provided in accordance with the National Environmental Policy Act.

GENERAL

We have serious concerns about the approach this Environmental Impact Statement takes. Whereas, it is the objective of an EIS to be an aid to the decision making process, this statement seems to have been prepared to justify a decision already made i.e., to channelize Pepper Creek. The purpose of the EIS should be to clarify issues and to forecast and analyze significant impacts. This in our opinion, has not occurred in this document. The EIS attempts to justify channelization on Pepper Creek but does not adequately describe existing fish and wildlife conditions nor does it adequately discuss the project's impacts on those fish and wildlife resources.

The EIS fails to point out the exact locations slated for channelization. It, also, fails to mention the location of associated wetlands that may be adversely impacted by project implementation. Cedar Swamp, the remains of what was once an extensive wetland near the project area, is not even mentioned. Further, there is no evidence that the President's Executive Orders on Floodplain and Wetland Management or the President's Water Policy Directives were considered in the drafting of this EIS.

According to the EIS the purpose of the project is to reduce flooding and provide drainage. Yet the statement indicates that the measure will "induce flooding along Route 26." The selected alternative defeats the purpose of the project. Further, a separate Delaware Department of Natural Resources project which has not been approved, a navigation channel from Route 26 to Holland Point, is needed to alleviate this downstream flooding.

SPECIFIC COMMENTS

Page 3, first paragraph - It should be noted that the best buffer strip along stream banks is a combination of grass, shrubs and trees. The existing vegetation along stream channels is much more efficient than a 10-foot grass buffer. An SCS and Forest Service publication, "Woodlands of the Northeast" on erosion and sediment control guides recommends "leaving essentially undisturbed buffer strips between disturbed areas (i.e., cropland) and water courses." On a 0% slope they recommend a 25-foot filter strip for common logging areas. The width increases with the slope. The proposed project seems contradictory to these recommendations.

Page 3, first paragraph - It should also be noted that a grass strip (SCS commonly uses a lespedeza, fescue or rye grass) has far less value to a variety of wildlife than does natural streamside vegetation (i.e., red maple, spice bush, poison ivy, dogwood, jewelweed, greenbriar, blackgum, honeysuckly, etc.).

Page 3, third paragraph - The statement is made that complete removal of hedgerows will reduce rabbit and quail habitat 5%. We question this figure based on other SCS reports. The estimate on the Marshyhope River Watershed was a 9.4% loss in quality of open land wildlife habitat, 6-12% in the Upper Chester River Watershed, and 10.3% on the Upper Choptank River Watershed. The discrepancy should be clarified.

Page 3, third paragraph - A discussion as to how retention or replacement of hedgerows will increase habitat quality by 3.5% should be included.

Pages 3&4 - It is stated that after project implementation marginal lands subject to flooding and drainage problems will become suitable for homesites. This is interpreted to mean that drainage of wetlands within the floodplain will be drained for the purpose of changing land use. This is contrary to both SCS Conservation Planning Memo 15 and the President's Executive Order on Floodplain Management.

Page 4, third paragraph - Should drainage be required of forest land adjacent to the channels, it could very well involve a wooded swamp, a viable part of the floodplain. These areas should be resurveyed for possible wetland types.

Page 5, first paragraph - Alternative plans to the selected plan have not been adequately addressed. With the President's Executive Order on Floodplain Management in effect, the integrity of the floodplain through woodland should be protected.

Page 5, second paragraph - Land treatment measures must be defined. Field ditches and lateral ditches proposed as the only land treatment measures are not in keeping with the intent of the President's Memorandum concerning the Improvement in Soil Conservation Service Programs. Here the need for reducing adverse environment impacts and improving the soil conservation functions of SCS were addressed. The Memorandum states "In planning watershed projects, SCS officials shall seek further acceleration of land treatment measures." Cost sharing funds are to be used for those measures which directly contribute to control of soil erosion and water pollution. Land conservation practices and areas requiring land conservation treatment should be identified. Requirements for periodic post-project monitoring to ensure implementation and Operation and Maintenance must be established.

Page 11 - Fishery Resources. The "beneficial effect on the fishery resources" and the existing fishery resource should be fully described. The principles developed for use in the Sacony Creek Watershed in Pennsylvania should be described. This section does not adequately describe the resources involved.

Page 11 - Wetlands. The wetland areas must be identified. How will acres of type 5 wetlands be increased from 17 acres to 22 acres after project implementation? How will impacts be avoided on wetlands as a result of project action? The remains of Cypress Swamp and Burnt Swamp are in the vicinity of the project area. What will be the impact on these two wetlands? This section does not adequately address wetland resources.

Page 12 - Man-Altered Perennial Streams. How and where perennial streams will be increased from 8.6 to 17.0 miles should be explained.

Page 12 - Man Altered Intermittent Streams. How and where ephemeral streams will be increased from 10.3 to 16.0 miles should also be clarified.

Page 16 - Adverse Impacts Which Cannot Be Avoided. Reduction in wildlife habitat through hedgerow removal is not listed as an unavoidable adverse impact. It is evident in the EIS that there is little intention of replacing hedgerows even though this could readily be accomplished. Reduction in wildlife habitat should, therefore, be added to this list as an adverse impact which will not be avoided.

Page 18 - Land Treatment. What are the components of the conservation plan discussed in this paragraph?

Page 18 - "No Project - Future Without Action." How wildlife habitat will decrease by 0.1 percent with no action and which species of wildlife this refers to should be addressed.

Page 19 - The statement is made that without the project annual benefits of \$48,900 will be foregone. Therefore, to provide a complete analysis the costs that will be foregone must also be addressed.

Page A-1 - It would appear that most of the material found in Appendix A should be incorporated into the main section of the document since this material is the substance of the report.

Page A-1 - Erosion and Sedimentation. This section identifies erosion and resulting downstream depositions of sediment as the cause of reduced channel capacity. It further suggests that channel construction is a significant contributor of the sediment deposits. From this section another and better alternative to the proposed action should have been developed.

Page A-2 - This page implies that ditching is needed to reduce sediment input into the waterway. Page 13 of the document, however, states that after construction and after the banks have revegetated, turbidity levels and suspended sediment concentrations will "recede to levels somewhat below preproject levels..." This statement suggests that the project will do little or nothing for sediment concentrations, turbidity, or water quality in general. There are no solid supporting facts for reduced sediment concentrations after project implementation. No discussion occurs about the impacts of increased velocities and resulting instream bank scouring which will occur after project implementation during periods of high flow. This should be addressed.

Page A-3 - The first two paragraphs imply that ditching the Pepper Creek drainage system is the only way to reduce erosion/sedimentation. Page A-1 states that the effects of channel construction "can be assessed quite accurately as depositions of upstream silt and sediment have formed an alluvial border on the inside of cold channel banks and reduced the channel width from 75 to 15 feet." This evidence "supporting" channelization, clearly supports the need for the development of other alternatives.

Page A-3 - The last paragraph states that the "project will significantly reduce the amount of erosion and downstream deposits of silt and sedimentation that will occur if the project is not done." Again, on page 13, it states that the project is not expected to have a significant effect on water quality. The contradiction should be clarified.

Page A-11 - What constitutes a "high value herbaceous cover" should be discussed.

Pages A-10 & A-12 - Openland Wildlife and Woodland Wildlife. Which openland and woodland species does the statement refer to?

Page A-16 thru A-23 - Stream Fish Habitat. This section attempts to support channelization on the basis of increasing species diversity. Actually, a unique aquatic habitat which only occurs in areas with little or no relief, heavy organic material input, low ph, and low dissolved oxygen supports aquatic species that are dependent on those very parameters. To alter a stream to a temporary fast moving water condition which would not naturally occur due to the relief (much of this area was part of an extensive swamp prior to 1954) is not necessarily a best fishery management practice.

Page A-30 - Water Quality. The second two paragraphs are unclear.

Page A-30 - The statement is made that total flow volume could decrease through increased evapotranspiration by crops. It should be noted that the existing trees along the channels have evapotranspiration rates tremendously exceeding that of crops and their removal will on fact be responsible for increasing the flow. Therefore, if decreasing total flow volume is the goal, then the trees should be protected.

Page A-33 - The statement is made that turbidity levels are expected to increase slightly during construction. This statement is not supported by other channelization projects on the Eastern Shore. The EIS for the Upper Choptank River Watershed for example states that construction elevates turbidity levels even after the establishment period. Turbidity levels were nearly twice as high on sites with PL-566 construction as on those sites without. The statement that "Pepper Creek flood and drainage project will reduce both the short-term and long-term turbidity levels in the channels of the system" should either be supported with data or changed to reflect past evidence.

As we noted the description of project impacts on fish and wildlife resources is inadequate. An equal deficiency is the lack of attention and commitment to measures which could mitigate the obvious negative impacts on these resources. A revised draft or final environmental statement should address both of these concerns in depth.

SUMMARY

The EIS appears to be in direct conflict to the President's Executive Orders concerning floodplain and wetland management. This document does not adequately describe the existing fish and wildlife resources or the impacts on those resources of the project area. It contains erroneous information and does not adequately identify channelization activity. These items should be fully addressed.

Further, the project and its induced flooding is dependent for relief on a navigation project that has not been and, quite probably will not be, approved for construction. There is no discussion of alternative

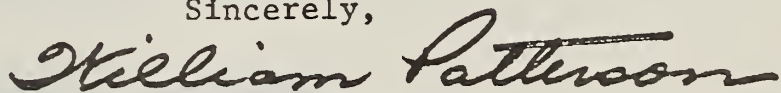
plans should the navigation channel not be implemented. Also, there is no mention of permits that will be required prior to construction. This should be discussed. Should Corps of Engineers permits be required, the Fish and Wildlife Service will probably object to the project as it is presently described.

We hope the above comments will be evaluated on the basis with which they were made. That is, to help improve the statement to the point that it will fulfill the intent of NEPS and can be used effectively in the decision making process on this project. Because of the inadequacy of the draft statement, we believe that a revised draft is necessary to provide sufficient basis for review.

We are particularly concerned that this project was developed with a complete disregard for the Channel Modification Guidelines. Our records show that the requirements of the first four steps - Preapplication, Application, Planning and Detailed Planning - of the Guidelines' Coordination of Field Level Planning have not been complied with except in the most superficial fashion. Considering the level of commitment which both our Departments have made to the full implementation of the Guidelines, the present situation is a serious failure in required coordination. Since the first level of coordination (SCS State Conservationist/FWS Area Manager) has not been successful in problem resolution, it is our intention to elevate this proposal to the next level (SCS Administrator/FWS Director) of review and coordination. It is our recommendation and request that no further action be taken in regard to this proposal until that required coordination has been accomplished.

Further coordination with the U.S. Fish and Wildlife Service may resolve our concerns regarding this proposal. However, if this is not the case then the Department of the Interior will consider referring it as environmentally unsatisfactory to the Council on Environmental Quality under the procedures in 40CFR 1504.

Sincerely,

A handwritten signature in cursive script that reads "William Patterson". The signature is written in dark ink and is positioned above the printed name.

William Patterson
Regional Environmental Officer

SUSSEX COUNTY COMMUNITY ACTION AGENCY, INC.

508 N. DUPONT HIGHWAY
GEORGETOWN, DELAWARE 19947

STANFORD L. BRATTON
EXECUTIVE DIRECTOR

October 9, 1979

TELEPHONE
(302) 856-7761

Mr. Grady E. Griggs, P.E.
State Conservation Engineer
Soil Conservation Service
U. S. Dept. of Agriculture
9 E. Loockerman Street
Dover, Delaware 19901

RE: Pepper Creek Tax Ditch
Dagsboro Hundred

Dear Mr. Griggs:

Please be advised that we have reviewed the plans for excavations of Pepper Creek and its connecting drainage ditches and find no adverse effects resultant from these actions. In point of fact, we believe the surrounding low-income and minority communities served by these drainage routes will receive a direct benefit as a result. Standing water in yards, driveways and even some intersections of the area has long been a problem. The growth potential for these communities and similar ones we think will be enhanced. We therefore recommend this project highly.

Sincerely,



Stanford L. Bratton
Executive Director

SLB/clt



DELAWARE RIVER BASIN COMMISSION
P. O. BOX 7360
WEST TRENTON, NEW JERSEY 08628
(609) 883 9500

HEADQUARTERS LOCATION
25 STATE POLICE DRIVE
WEST TRENTON, N J

GERALD M. HANSLER
EXECUTIVE DIRECTOR

October 4, 1979

Mr. Otis Fincher
U.S.D.A.
Soil Conservation Service
204 Treadway Towers
9 E. Loockerman Street
Dover, Delaware 19901

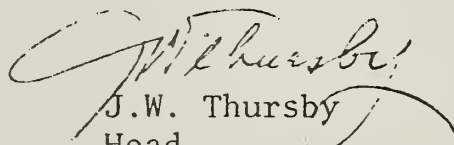
Subject: Draft EIS, Pepper Creek
Flood Prevention and
Drainage RC&D Measure.

Dear Mr. Fincher:

Since the subject project is outside the Delaware River Basin,
we have no comment.

Thank you for the opportunity to review the Draft EIS.

Sincerely,


J.W. Thursby
Head
Environmental Unit

JWT/hc



U.S. Department of Energy
Washington, D.C. 20585

OCT 24 1979

Otis D. Fincher
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
204 Treadway Towers
9 E. Loockerman Street
Dover, Delaware 19901

Dear Mr. Fincher:

This is in response to your request to review and comment on the draft Resource Conservation and Development (RC&D) measure plan and draft environmental impact statement for the Pepper Creek Flood Prevention and Drainage RC&D measure in Sussex County, Delaware. We have examined both documents and have no comments to offer.

Sincerely,

A handwritten signature in cursive script that reads "Ruth C. Clusen".

Ruth C. Clusen
Assistant Secretary
for Environment



REGION III

DEPARTMENT OF TRANSPORTATION
REGIONAL REPRESENTATIVE OF THE SECRETARY
434 WALNUT STREET
PHILADELPHIA, PENNSYLVANIA 19106
September 27, 1979

MEMORANDUM TO: Otis D. Fincher
State Conservationist
U.S. Department of Agriculture
Dover, Delaware

SUBJECT: Draft Environmental Impact Statement -
Pepper Creek Flood Prevention & Drainage
RC&D Measure - Delaware

We have reviewed the subject draft EIS and have no significant comments to offer. The project details should continue to be coordinated with the Delaware Department of Transportation.

We appreciate the opportunity to review and comment on the document.

Sally H. Cooper
Regional Representative
of the Secretary

cc: R. Davino, FHWA
J. Canny, Office of Env & Safety, USDOT, P-22



It's a law we
can live with.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

OCT 15 1979

Otis D. Fincher
State Conservationist
Department of Agriculture
Soil Conservation Service
204 Treadway Towers
9 E. Lookerman Street
Dover, DE 19901

Dear Mr. Fincher:

We have completed our review of the draft Environmental Impact Statement concerning the Pepper Creek Flood Prevention and Drainage RC&D Measures. The EPA has reservations concerning the environmental effects of the proposed action. EPA believes that further study of the project is required. We have placed the proposal in EPA's reporting category ER-2. We believe that more information is necessary to complete our review. Specific comments are appended.

The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our reviews on proposed actions under Section 309 of the Clean Air Act.

Sincerely yours,

John R. Pomponio

John R. Pomponio
Chief
EIS & Wetlands Review Section

Attachment

EPA Review and Comments

1. The draft EIS does not adequately address the impact of the project on Pepper Creek down stream of the Route 26 bridge. While classified as a navigation channel this portion of the creek is extremely shallow. At present, deepening of the navigation channel has not received Section 404 approval. It is presumptuous to evaluate SCS Pepper Creek impacts based upon unofficial Corps plans. The proposed Corps of Engineers' channel widening and deepening as a navigation channel would destroy wetlands and stream bed habitat and is contrary to wetlands guidelines. Further, there is little public access to the stream so that marginal public use would be derived from the navigation project.

2. The draft EIS does not address the impact on Pepper Creek between Route 26 and Highway 113. According to a citizen from the area, during extremely heavy rains the water backs up at the bridge due to the size of the culvert under Route 26. The area below the bridge is usually not flooded.

3. According to President Carter's Executive Order 11988 pertaining to the floodplains, Federal policy is to avoid adverse impact on floodplains and to restore the natural and beneficial value served by floodplains. We would not, therefore, support the development of the area within the floodplain for residential use. However, we would not object to maintenance of some necessary ditching to support existing agricultural activities. The EIS should better define the minimum work necessary to accomplish this objective.

4. Wetland areas which may be impacted are only scantily described throughout the DEIS. In order to fully evaluate potential wetland impacts, detailed maps indicating stream, ditch and wetland areas should be included in the document. Descriptions of wetlands vegetation to be impacted should accompany the maps.



October 15, 1979

Mr. Otis D. Fincher
USDA Soil Conservation Service
204 Treadway Towers
9 E. Loockerman Street
Dover, Delaware 19901

Dear Mr. Fincher:

The Department of Commerce has received the draft environmental impact statement entitled, "Pepper Creek Flood Prevention and Drainage RC&D Measure, Sussex County, Delaware" which accompanied your letter of August 17, 1979. We have reviewed the statement, and offer the following comments for your use. In addition, we are forwarding a comment from the National Oceanic and Atmospheric Administration (NOAA) Environmental Data and Information Service (EDIS).

GENERAL COMMENT

The text contains an apparent contradiction which should be explained. The environmental statement refers to the flat topography which has governed project design (page 5, line 3; page 14, line 10), yet there are well-drained hills near the project (page 6, line 8; page 12, line 18). The project map, Appendix B, does not show any of this topography even though the text states that "...the construction rights-of-way (may) come within 100 feet of the soil boundaries delineating those well-drained hills indicated on the accompanying maps." (page 6, lines 24-26, emphasis added).

SPECIFIC COMMENTS

Appendix A, pages A-1 to A-37 - The Appendix is poorly organized, and difficult to follow. Tables 1 to 7 are not in numerical order; and Table 8, page A-34 is not numbered. Page A-17 is missing; the place between pages A-16 and A-18 is occupied by a duplicate page A-19.

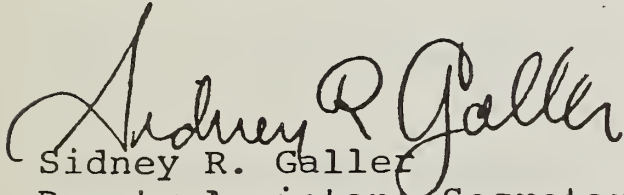
Appendix A, page A-11, line 14 - The reference to mean distances should be Table 7, not Table 1.

Appendix A, page A-33, footnote 3 - Footnote 3/, given as the reference for allowable levels of total coliform for secondary contact recreation (pages A-32 and A-33, paragraph G, last 3 lines) presents instead the standard for fecal coliform.

Appendix B, page B-1, Project Map - The map needs considerable improvement. It was impossible to follow the project description or the location of flood and drainage areas on this map. Sampling stations 21, 22, 23, and 24 (Tables 1, 4, and 5) are not shown, nor are the topographic features mentioned in the General Comment, above.

Thank you for giving us the opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate 5 copies of the final environmental statement.

Sincerely,

A handwritten signature in cursive script, reading "Sidney R. Galler".

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure: Memorandum from: K. Hadeen, NOAA/EDIS



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL DATA AND INFORMATION SERVICE
Washington, D.C. 20235
Center for Environmental Assessment Services

September 21, 1979

OA:D24:NDS

TO: PP/EC - R. Lehman

FROM: OA/D2 - K. Hadeen

SUBJECT: DEIS 7908.35 - Pepper Creek Flood Prevention and Drainage RC&D
Measure; Sussex County, Delaware

The purpose of the project is flood reduction, yet there is no climatic information relating to flooding. The DEIS would be enhanced by a discussion of the type, duration, and frequency of meteorological events which result in damaging floods. Climatological information which may be useful is available from the National Climatic Center, Asheville, North Carolina 28801.

(RF: D. LeComte, D242)

Attachment - DEIS 7908.35

Rec'd PP/EC
SEP 25 1979



UNITED STATES DEPARTMENT OF AGRICULTURE

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20250

SEP 18 1979

OFFICE OF EQUAL OPPORTUNITY

IN REPLY 8140 Supplement 8

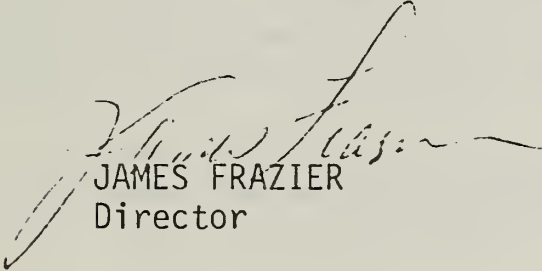
REFER TO:

SUBJECT: Draft Plan and Environmental Impact Statement, Pepper Creek
Flood Prevention and Drainage RC&D Measure, Delaware

TO: Otis D. Fincher
State Conservationist

Verne M. Bathurst
Deputy Administrator for
Administration, SCS

SCS Guidelines for Compliance With NEPA 7 CFR 650.8(b)(3), require Environmental Impact Statements to describe the impacts of proposed actions on "...demographic and social effects, including civil rights impacts on minority groups and low-income persons." The Draft Statement for the Pepper Creek RC&D Measure does not identify and describe effects on minority populations. The Final Statement should indicate that this has been done and that no adverse effects on minority persons will result from the proposed actions.



JAMES FRAZIER
Director



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333

October 3, 1979

Mr. Otis D. Fincher
U.S. Department of Agriculture
Soil Conservation Service
204 Treadway Towers
9 E. Loockerman Street
Dover, Delaware 19901

Dear Mr. Fincher:

We have reviewed the Draft Environmental Impact Statement (EIS) for Pepper Creek, Flood Prevention and Drainage RC&D Measure, Sussex County, Delaware. We are responding on behalf of the Public Health Service.

The principal effects of this action--temporary degradation of water quality during construction and peak discharge rates to increase downstream in the Dagsboro area--need to be more thoroughly addressed regarding specific adverse effects and possible mitigation efforts. We are concerned with the possibility of water degradation during construction, particularly by contamination from petroleum products. Appropriate monitoring efforts should be instituted during the construction period to safeguard against this possibility. Although an improvement in channel efficiency is a specific project purpose, the effects of out of bank flow downstream during "certain" storm events should be further explained (p. 9). The expected frequency of these storm events should be noted.

No significant vectorborne disease impacts are expected from this development. Drainage improvement projects of this type generally benefit vector mosquito control by minimizing or eliminating some breeding habitats.

Thank you for the opportunity of reviewing this statement. We would appreciate receiving a copy of the final EIS when it becomes available.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Bureau of State Services



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

11 OCT 1979

Mr. Otis D. Fincher
State Conservationist
Soil Conservation Service
204 Treadway Towers
9 East Lockerman Street
Dover, Delaware 19901

Dear Mr. Fincher:

This is in response to your letter of 17 August 1979 requesting comments on the draft RC&D measure plan and draft environmental impact statement (DEIS) for the Pepper Creek Flood Prevention and Drainage RC&D Measure, Sussex County, Delaware.

Measures described in the plan would not conflict with any existing or proposed flood control programs of the U. S. Army Corps of Engineers.

The EIS should discuss the need for a Department of Army permit as required under Section 404 of the Clean Water Act (33 USC 1344). Local sponsors should be advised to coordinate with the Philadelphia District Engineer for this permit. Pre-application consultation should be arranged with Mr. T. F. Schina, Chief, Permits Branch; U. S. Army Engineer District, Philadelphia; U. S. Custom House; 2nd & Chestnut Street; Philadelphia, PA 19106 (215-597-2812).

Sincerely,

Michael Blumenfeld
Assistant Secretary of the Army
(Civil Works)



STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF FISH AND WILDLIFE

P.O. Box 1401
EDWARD TATNALL BUILDING
DOVER, DELAWARE 19901

PHONE: (302) 678 - 4431

OFFICE OF THE
DIRECTOR

October 17, 1979

Mr. Otis D. Fincher
State Conservationist
Soil Conservation Service
204 Treadway Towers
9 E. Lookerman Street
Dover, De. 19901

Dear Mr. Fincher:

We have reviewed the Pepper Creek RC&D Draft Environmental Impact Statement and offer the following comments:

Draft EIS

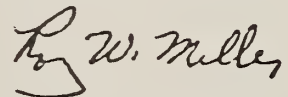
- Page 5. The proposed navigation channel downstream of Route 26 has not been approved yet by the appropriate federal and state review agencies. To count on this dredging to eliminate the project - induced flooding along Route 26 would be premature at this time. What would be the effect on the downstream area if the navigation channel were not approved?
- Pg. 5&10 There are apparently conflicting statements on these two pages in regard to the anticipated conversion of farmland to residential or other uses. Would this project result in more or less conversion of previously marginal farmland to other uses?
- Pg. 14. This would be an excellent opportunity to set up a monitoring program to show if levels of N and P actually decrease or remain the same in constructed channels as asserted or increase. Perhaps a monitoring program with the cooperation of the state or the Sussex 208 Program would be appropriate. This avenue should be investigated so that the results could be applied to other proposed drainage projects in Delaware
- Pg. 26. Charles A. Lesser was not present at this meeting.
- A-3. Statements like "The Pepper Creek Project will significantly reduce the amount of erosion and downstream deposits of silt and sedimentation" should be documented. We would like to see a modest project set up to assess the volume of sedimentation and nutrient releases resulting from this project.

A-16 There does not seem to be a map of the fishery sampling stations enclosed. This oversight should be corrected on subsequent editions.

Someone not familiar with the methods developed for the Sacony Creek watershed (such as myself) would have a little trouble evaluating the results presented in the stream fish habitat section. Consequently, I have no comments about these data other than to point out that on Pg. A-20 it is risky to say that stream channel work does not adversely affect diversity of the macroinvertebrate community based on only one sampling station in a recently channelized area.

In general we recommend that every effort be made to preserve as many hedgerows as possible and to modify only one channel bank wherever physically possible, particularly in existing wooded stretches. Maintenance of buffer strips and timely replanting of hedgerows should do much to minimize adverse impacts on associated biota. Every effort should be made to preserve existing wetlands in the project area.

Sincerely yours,

A handwritten signature in cursive script that reads "Roy W. Miller". The signature is written in dark ink and is positioned above the printed name.

Roy W. Miller
Supervisor of Finfisheries

RWM:ef



R0000 892237